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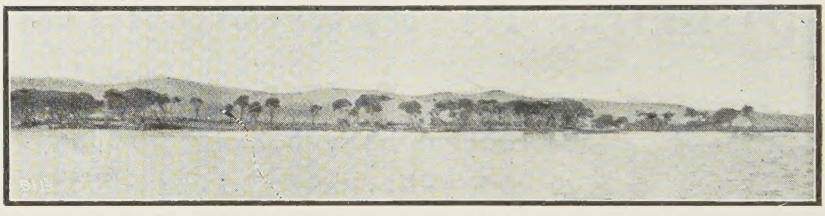
THE HAURAKI PLAINS:

SOME NOTES ON THE SOILS.

B. C. ASTON, F.I.C.

DURING the last few months, as time and opportunity have offered, I have endeavoured to learn something of the conditions prevailing in the Hauraki Plains district, which is unique in New Zealand's farming annals. There are, no doubt, many instances of drained swamps, marine and lacustrine, throughout the Dominion exhibiting on a smaller scale a feature here and a feature there paralleled at Hauraki, but to obtain the sum of the conditions which constitutes the claim to uniqueness one must go to Hauraki. Nearly every variety of soil is to be found in the 90,000 acres which are here set apart for drainage and reclamation. On the coastal area are littoral

clays containing carbonate of lime derived from the shells of sea-animals, common salt from the sea, and a large amount of available plant-food liberated by the salts of the sea-water. In this connection it is interesting to recall the fact that many New Zealand soils which have been or are now subject to marine inundation show a relatively high content of available plant-food. Especially is this to be observed in the case of phosphoric acid, usually so deficient in the northern soils and so costly to apply in the quantities needed. In the instance under notice the great amount of plant-food in the samples D 1124 (1–3) suggests that these soils, now that they are made secure from flooding, might be more profitably used for market-gardening than merely for grazing. When these soils are brought into proper tilth by suitable tillage and treatment with lime, organic matter, or other amendments, they may be expected to grow large quantities of such crops as asparagus, beet, kale, turnips, cabbage, onions, and similar plants. Water

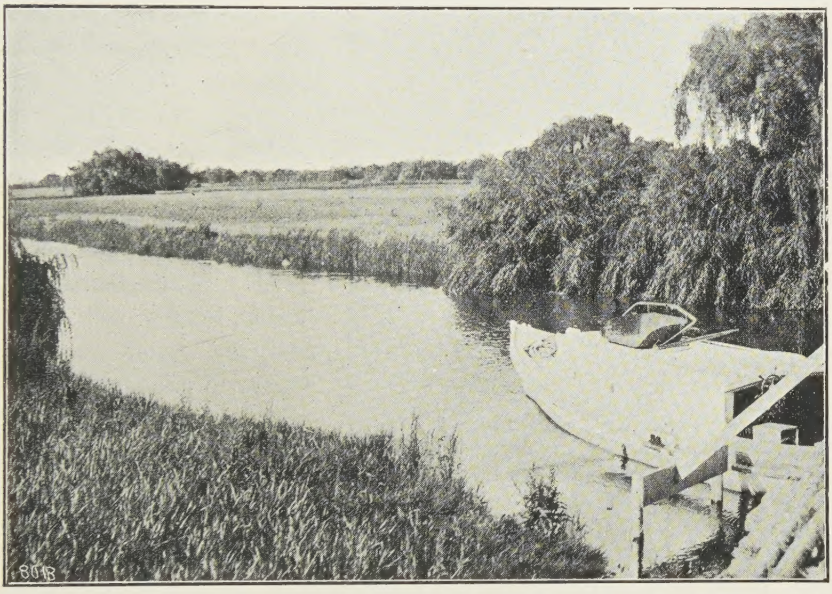


B. C. Aston, photo.] A. TYPICAL MARINE SHORE.

carriage to the Thames and Auckland City will provide a cheap and easy means of transport to markets which will doubtless prove capable of absorbing all produce at a good profit to the grower. The littoral clays of the Hauraki Plains in the virgin state grow mangrove (*Avicenna*) woods and a sward of such other salt-loving plants as *Salicornia* and *Samolus*. The photo (A) shows the vegetation of typical marine shores.

As we ascend the Piako River and recede from the salty area the vegetation changes, and vast stretches of "purua grass" greet the eye in every direction. This plant—not a grass, but belonging to another family—is the *Scirpus maritimus* of the botanist, and is greatly relished by cattle. The semi-wild herds which roamed the swamp before it was settled fattened on the large succulent portions of the plant. It grows to a height of from 4 ft. to 8 ft., and the parts above ground die down in the autumn, when a fire may easily be put through the dried plants. The illustration (B) shows a typical view on the Piako River; the wharf in the foreground

is at the end of the Waikaka Road, some twelve miles from the coast. The oil-launch is here the farmer's friend in navigating the rivers of the plains, bringing stores and passengers and taking away cream at a very low rate. At the margin of the river which meanders through the swamp are dotted weeping-willows, which mark the wandering course of the stream. The willows have not been planted, but arise from broken branches which have drifted down the stream in flood-time and have rooted along the bank. Lastly, and most important, the illustration shows a pure association of *Scirpus maritimus*. That is to say, the "purua grass"

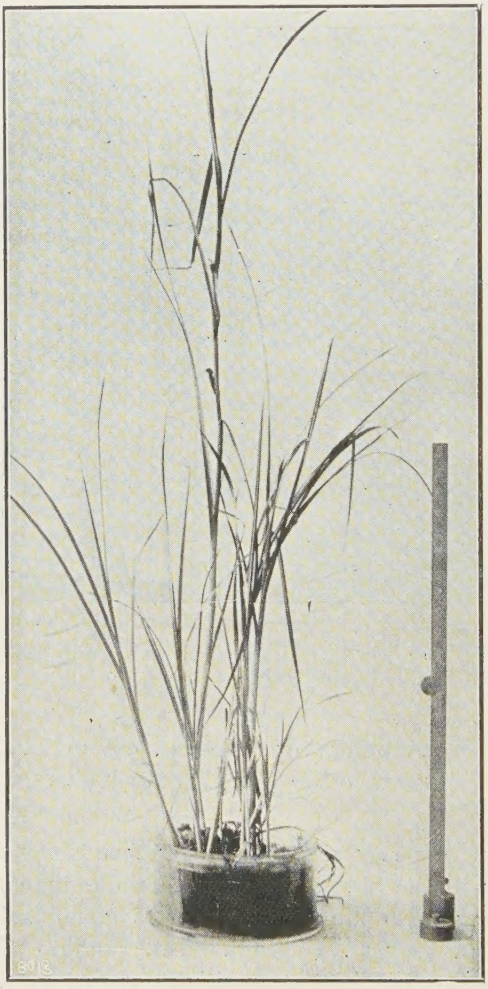


B. VIEW ON THE PIAKO RIVER, SHOWING "PURUA GRASS" (SCIRPUS MARITIMUS) FORMATION IN THE FOREGROUND.
B. C. Aston, photo.]

here grows to the exclusion of all other vegetation, except perhaps at the margin, where docks (*Rumex crispus*) and convolvulus (*C. sepium*) sometimes thrive.

The "purua grass" grows in peaty soil, which contains millions of the small tubers belonging to the plant. It is from these tubers that the plant annually springs into life when winter is gone, and attains with great rapidity a height of several feet. Photo C shows a laboratory water-culture of *Scirpus maritimus* grown in a few weeks, and, as the scale at the side shows, is about 4 ft. high. The farmer will at once suspect, and rightly, the feeding-capacity of

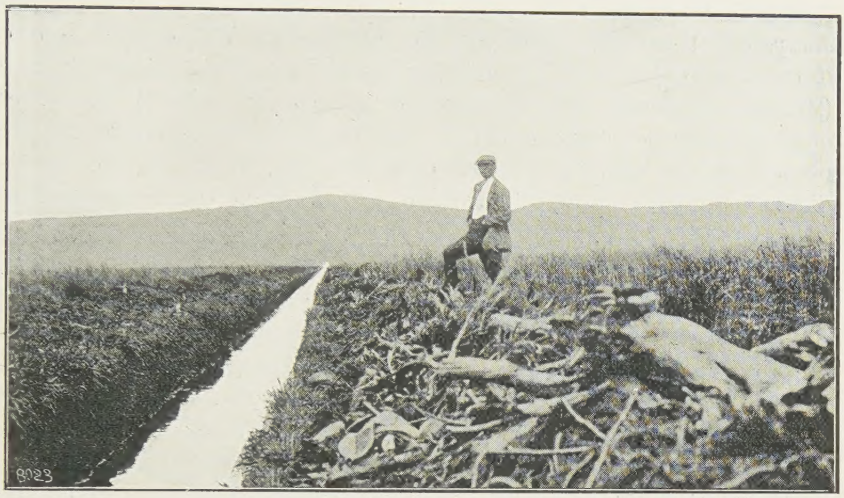
a plant which grows so rapidly. In truth the substance of this plant is somewhat weak, and I am informed that although stock may be fattened upon it they cannot be driven any distance afterwards. One settler has endeavoured to make ensilage of the "purua grass," but his efforts were foiled through circumstances which left the question as to the possibility of making ensilage undecided. I consider that the Department's expert on ensilage (Mr. Dibble) might visit the district and instigate experiments with this plant.



C. LABORATORY WATER-CULTURE OF SCIRPUS MARITIMUS.
F. T. Leighton, photo.

The peaty soil, of which samples Nos. D 1124—4, D 1256—3, and D 1256—5 show the composition, extends to varying depths, a fact which is made abundantly clear as one ascends one of the main drains. Beneath a mass of only partially decomposed plant-remains a black humus soil is cut through, under which are layers of mineral matter of different degrees of fineness and varying chemical composition. This is well shown in Mr. Thompson's comprehensive reports on the results of the boring operations. Clay, sand, gravel, pumice, all occur, and sometimes logs and peat. Photo D shows a large quantity of logs encountered quite near the surface in one of the drains.

Receding farther from the sea the vegetation changes again. *Scirpus maritimus* gives way to flax (*Phormium*), sedges (*Carex*),



D. SHOWING LOGS UNEARTHED IN DRAINING.

E. WHITE-PINE AND MANUKA ON HAURAKI PLAINS.

B. C. Aston, photos.]

and raupo or bulrush (*Typha*) (see F), and on the drier parts to manuka (*Leptospermum ericoides*) and white-pine (*Podocarpus dacrydioides*) (see E). Besides the manuka and white-pine there is often a mixed scrub (G) consisting mostly of *Olearia virgata*, toetoe (*Arundo conspicua*), and cabbage-tree (*Cordyline australis*), the latter often forming dense groves (H). This photo shows an entire absence of peat in the clay top soil, an excellent crop of oats in the middle distance, and a typical cabbage-tree association in the background.

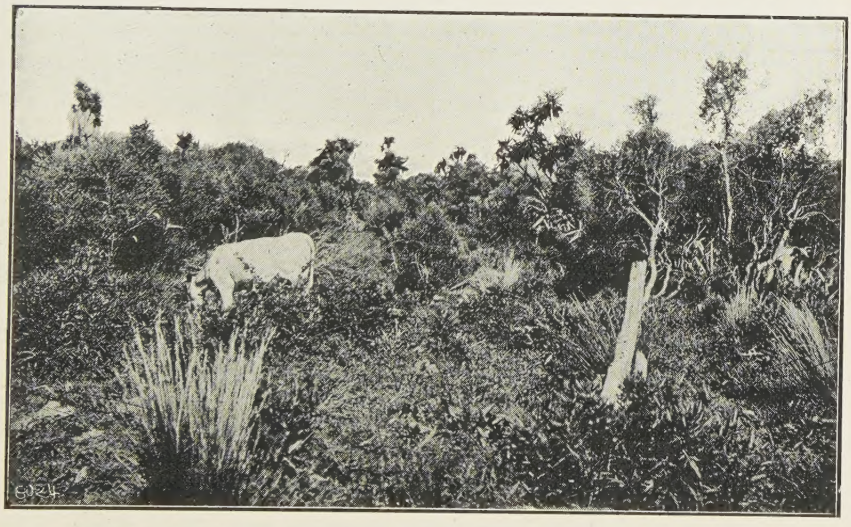
In the main, these changes in the vegetation betoken changes in the water-content and even in the chemical composition of the soil. A condition which is suitable for the growth of mangrove and *Salicornia* and other salt-resisting plants will not allow other plant-life to compete with them, and hence the former survive. Similarly, the "purua grass" under fresh peaty swamp conditions maintains absolute possession of the area. When, however, we come to drier and peatless soil-conditions a host of unrelated plants compete for supremacy, and it will take some research to determine whether definite soil-conditions can be correlated with such distinct plant associations as those of the manuka (almost pure), the flax-*Cladium*-toetoe, the white-pine forest, and the scrub. It is obvious that exact knowledge of this sort would be useful to the farmer as well as valuable to science, and it is hoped to carry out a systematic soil-survey of this most interesting area in the near future.

A question which is greatly agitating the settlers is that referring to the water-supply, which is at present obtained from bores. The water often contains a comparatively large amount of bi-carbonate of iron with carbonic-acid gas, the troughs becoming covered with a spongy deposit of iron oxides, which is sometimes erroneously attributed to the growth of a fungus and held responsible for the deaths of cattle. Whether the carbonic-acid gas may be injurious to stock drinking the water is a matter for future inquiry. I am informed that stock prefer to drink from stagnant water rather than from the water as it issues from the bore. The obvious method for removing the carbonic-acid gas from the bore-water is to allow it to flow into a shallow puddled pond. The gas will then speedily escape.

CONCLUSIONS.

The Hauraki Plains (formerly called the Piako Swamp) present many features which are novel to the farmer, and with which he should therefore be assisted to cope in his struggle to break in this unique area. Analysis shows that the soils may belong to

F. FLAX AND RAUPO ON HAURAKI PLAINS.



G. MIXED SCRUB OF OLEARIA, TOETOE, CABBAGE-TREE, ETC.
B. C. Aston, photos.]

extreme types of clays, peats, and sands. The great diversity in the flora confirms the analysis. The fondness which stock exhibit for some of the original components of the flora suggests that the fact might be utilized in the settlement of the area.

The water-supply, though of good quality, is unusual in composition, and its effects on stock require to be investigated in order to answer positively the questions which are put by those suspicious of its effect on the animals.

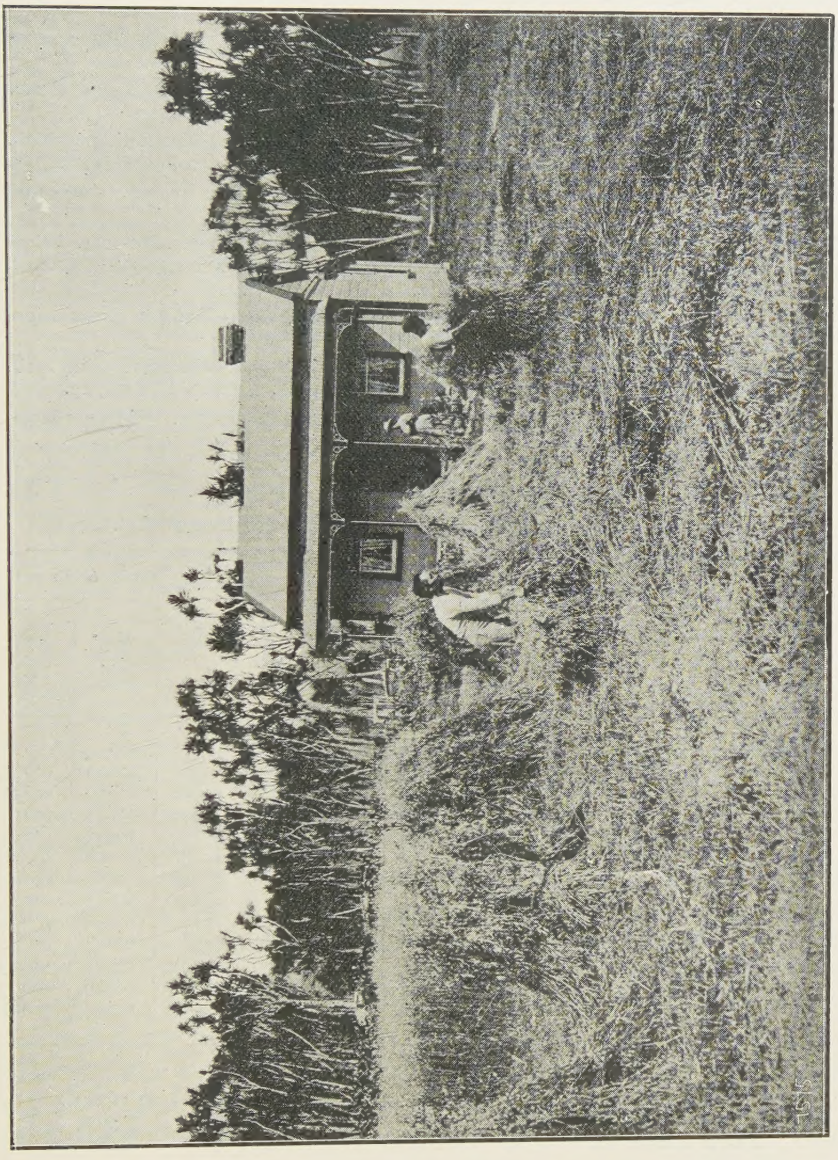
H. A FINE CROP OF OATS, SHOWING ALSO TYPICAL CABBAGE-TREE FORMATION IN THE DISTANCE.
B. C. Aston, photo.]

Improvement of the soils may be effected by liming the tenacious clays and claying the peaty soils. Experiments in mixing the abundant humus matters with clay soils might also be carried out. A systematic soil-survey of the area may be expected to result in great benefit to the farming community.

HAURAKI PLAINS SOILS.—LOCALITIES OF SAMPLES.

D 1124—1. Soil from untreated paddock, Sparrow's farm, Shelly Beach. Three places, 9 in. Collected 30/9/13.

D 1124—2. From paddock near house, Sparrow's farm, Piako River. Clay paddock, but does not contain so much clay as No. 1. Collected 30/9/13.



Lands Department photo.] I. OATS GROWING ON VIRGIN LAND AT WAIKAKA.

D 1124—3. Clay soil from Waite's farm, Te Hopai Road, Piako River. Three places, 9 in. Collected 30/9/13.

D 1124—4. Peaty soil from Coppin and Weber's farm, near Waite's. *Sphagnum* bog. Five places, 12 in. Collected 30/9/13.

D 1124—5. Clay from below peat in No. 4. Three places, 12 in. Collected 30/9/13.

D 1256—1. Section 10, Block VI, Waihou Survey District, in white-pine association. Two places, 9 in. Collected 17/11/13.

D 1256—2. Section 1, Block VI, Waihou Survey District, Makumaku Road. Manuka association. One place, 10 in. Collected 17/11/13.

D 1256—3. Section 17, Block VI, Waihou Survey District, Robinson's paddock. Humus. Clay is 1 ft. below surface. Four places, 1 ft. Collected 17/11/13.

D 1256—4. Clay taken 1 ft. below No. 3, in drain. Two places. Collected 17/11/13.

D 1256—5. Black humus from spoil taken from drain. Originally 4 ft. below surface. Overlain by spongy, undecomposed, fibrous vegetable matter. Drain 7 ft. deep. Collected 18/11/13.

D 1256—6. J. Bevan's property, Waikaka. *Phormium-Cladium* association, Patetonga Road. Five places, 1 ft. Collected 18/11/13.

D 1256—7. Government reserve cottage, Patetonga Road, Waikaka. Clay soil, in English grass for eight years. Two places, 9 in. Collected 18/11/13.

D 1256—8. Sandy soil at Kerepehi, near Government house. Three places, 9 in. Collected 18/11/13.

ANALYSIS OF SOILS FROM HAURAKI PLAINS.

Figures (except *) show percentage of soil dried at 100° C.

Laboratory Number.	* Total Moisture.	Loss on Ignition.	Hydrochloric-acid Extract.				Total Nitrogen.	Citric-acid Extract.	
			Potash (K_2O).	Phosphoric Acid (P_2O_5).	Lime (CaO).	Magnesia (MgO).		Potash (K_2O).	Phosphoric Acid (P_2O_5).
D 1124—1..	44·40	16·44	0·37	0·24	0·45	1·09	0·481	0·033	0·066
D 1124—2..	39·01	19·87	0·33	0·21	0·37	0·85	0·597	0·100	0·062
D 1124—3..	37·99	15·08	0·33	0·14	0·42	0·88	0·422	0·056	0·032
D 1124—4..	62·57	54·98	0·16	0·11	Trace	0·42	1·226	0·138	0·014
D 1124—5..	43·21	7·10	0·41	0·12	0·41	0·73	0·124	0·043	0·044
D 1256—1..	23·37	11·11	0·23	0·09	0·18	0·34	0·258	0·018	0·008
D 1256—2..	24·70	15·21	0·20	0·10	0·15	0·26	0·369	0·010	0·007
D 1256—3..	65·15	41·75	0·15	0·17	0·20	0·33	1·216	0·031	0·024
D 1256—4..	26·17	8·44	0·36	0·11	0·34	0·88	0·159	0·048	0·044
D 1256—5..	65·99	86·50	0·09	0·03	0·95	0·52	1·005	0·034	0·002
D 1256—6..	57·30	22·18	0·13	0·19	0·60	0·29	1·284	0·037	0·023
D 1256—7..	29·72	13·90	0·51	0·10	0·29	0·51	0·336	0·029	0·009
D 1256—8..	21·28	7·00	0·06	0·03	0·13	0·14	0·138	0·014	0·001

Mechanical Analysis.

	D 1124 (1).	D 1124 (3).
Coarse sand	Trace.	Trace.
Fine sand	26·2	32·8
Silt	14·4	12·2
Fine silt	17·6	16·4
Clay	38·6	35·0
Moisture, &c.	3·2	3·6
	100·0	100·0

COW-TESTING.

A LESSON TAUGHT BY THE ASSOCIATIONS.

W. M. Singleton.

Many lessons have hitherto been drawn from the figures representing the yields of cows tested in some of the New Zealand cow-testing associations. The figures are replete with interesting information, and some further thought they suggest may be interesting to New Zealand dairymen. An endeavour has been made to follow the yields of individual cows through two consecutive seasons, and the returns from Kaupokonui, Stratford, and Cambridge associations have received attention in this direction. Records of young cows only have been reviewed.

The first thought that such work indicates is that an exceedingly large percentage of young cows are not considered worthy of a second year's testing. In herds tested two consecutive seasons, the figures indicate that of every hundred young cows, two, three, and four years of age, tested during the first season, only sixty-seven were considered worthy of a second trial—that is, the owners culled one from every three. Of these sixty-seven retained for the second season, the two seasons' records indicate that a further ten might very well have been culled, leaving only fifty-seven of the original hundred producing a minimum of 150 lb. fat as two-year-olds, 180 lb. as three-year-olds, 190 lb. as four-year-olds, and 200 lb. as five-year-olds. Those animals starting the test at three years and four years of age would, presumably, be the owner's selection from a larger number of animals of equal age which commenced their first lactation-period the same season. It would appear that the figures suggest that the percentage of "fair" cows is likely to be little more than 50 per cent. of those heifers which commence milking. The associations which included these cows had an average of 228 lb. butter-fat for all cows during these two seasons. It will be recognized that there is nothing unreasonable in expecting "fair" cows in these districts to produce 200 lb. butter-fat at maturity. It is, of course, admitted that these associations included the better class of dairymen, and that, although they were in some of the best parts of the Dominion from the viewpoint of dairying,

the 228 lb. butter-fat average is better than a cow census of these districts would indicate.

In the opinion of the writer, these figures are as strong an indictment against the use of the nondescript bull as can be desired. It is considered that less than 5 per cent. of New Zealand herds are headed by purebred bulls. A much smaller percentage is headed by a prepotent dairy bull—that is, a bull all of whose heifers prove good milkers.

I believe one of the greatest advantages of cow-testing work is evidenced in its causing members to be dissatisfied with present conditions and returns. When a member feels in such a spirit there is hope of improvement. Purebred dairy bulls with dams holding authenticated yearly records are now to be obtained. Dairymen are learning that they can no longer afford to head their herd with a bull that leaves one-half of his heifers culls from the milking standpoint.

It is only within the last year that bulls with authenticated record dams could be obtained from any considerable number of breeders. Looking at the position which previously obtained from the dairyman's viewpoint we can realize something of the many discouragements entailed in the grading-up and maintaining of a heavy producing dairy herd. Such losses are not always appreciated by the uninitiated; nevertheless they prove a most effective brake on the progress of the dairy industry in New Zealand.

LUCERNE FOR DAIRY CATTLE.

PRIMROSE MCCONNELL.

OF all fodders tested at the Ruakura Farm of Instruction during the past season lucerne gave the best results in milk-production. At the present time lucerne ensilage is being used for the cows, and it is eaten with evident relish. The first growth of the season was cut with the intention of making hay, but the weather being unfavourable the lucerne was made into ensilage after lying on the ground for eight days. When stacked it was in a semi-dry state, but a copious supply of water was added during the building operations. The result was a very high temperature, but the ensilage is fairly succulent and has a pleasant flavour, which is a great contrast to that resulting from lucerne stacked in a perfectly green condition, the flavour of the latter being very objectionable. I feel quite certain that lucerne ensilage should be made from well-matured material in order to avoid sour silage.

HEMLOCK (CONIUM MACULATUM).

A. Hughes.

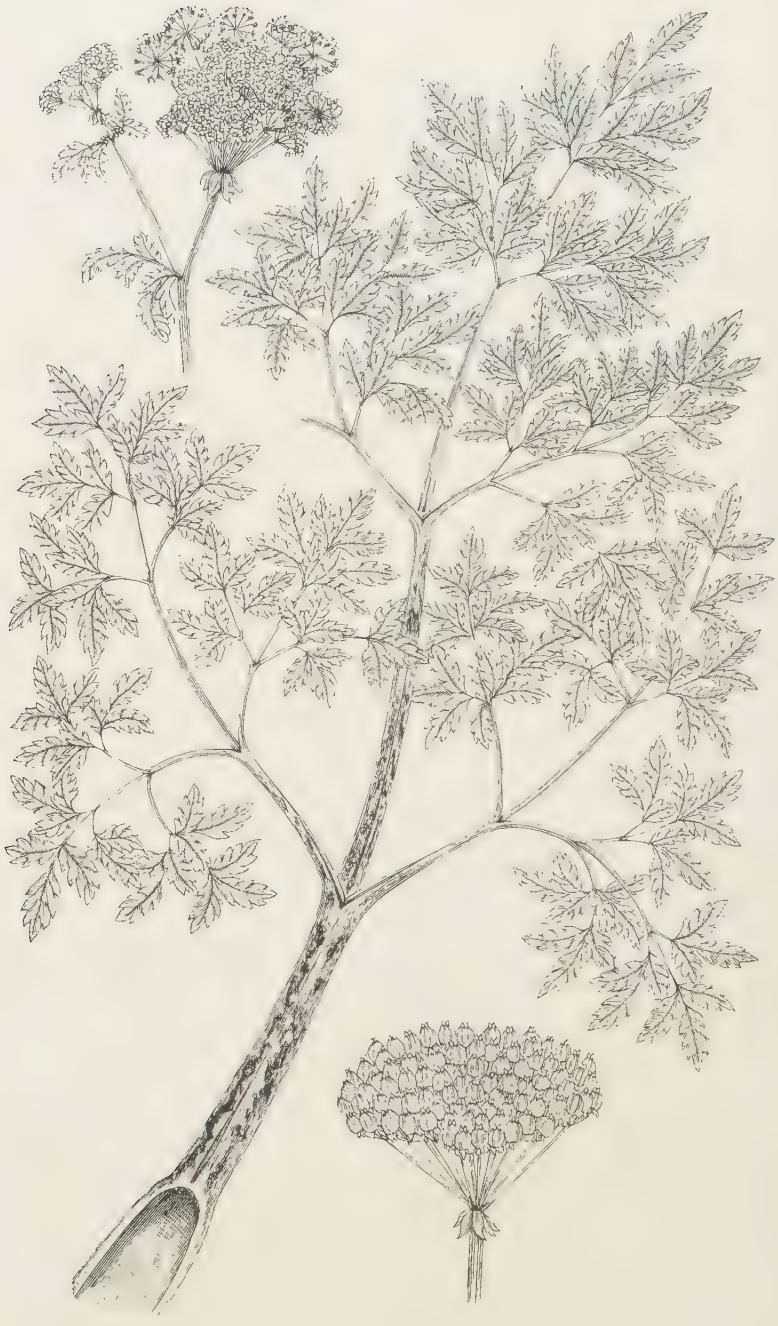
This plant, which is included in the Third Schedule of the Noxious Weeds Act, is becoming very common, and is to be found in many paddocks, stockyards, saleyards, and on the roadside. It is a European plant with compound umbels of small white flowers—that is, a number of flower-stalks spreading from one common centre, each bearing a single flower. It has a round, hollow, green stem, and grows from 2 ft. to 6 ft. high, the leaves being large, tri-pinnate, and of a dark shiny green, the root being like a small parsnip. It is a biennial. Both the leaves and flowers resemble those of a carrot. The plant has a nauseous smell if rubbed or bruised.

The question is often asked, "Is it poisonous?" This it most certainly is, and has been known to be so from the earliest times. It is referred to in the Book of Deuteronomy, ch. xxix, *v.* 18, and by the Prophet Hosea, ch. x, *v.* 4. Its Hebrew name, Rosh, means "poisonous herb." It was with hemlock that Socrates was poisoned; and Shakespeare mentions it in "Macbeth," where he describes the three witches brewing a hell-broth, and casting in the deadly hemlock. The poisonous principle possessed by hemlock is conine, which is extremely poisonous, and causes death by action on the nervous system. The symptoms are weakness and a staggering gait, passing gradually up the spinal cord until it reaches the respiratory centre, when death ensues. The fruit is the chief source of poison. In the West of England it is very much dreaded, and when seen is quickly cut down.

An illustration of hemlock is shown on the following page.

The proper management of the soil is the most vital factor in successful farming.

One of the most serious economic blunders of the present day is the use of inferior seed. It is a waste of capital, land, and labour to use impure seed or seed of low vitality. Cheap seed can mean only poor plant-production and reduced carrying-capacity. The progressive farmer should aim at making his land produce nothing but useful plants, and these of the best feeding-value.



HEMLOCK (CONIUM MACULATUM).

HEDGES.

W. H. Taylor.

The selection of a hedge-plant is not infrequently a very puzzling matter, and too often a wrong selection is made. The difficulty arises by reason of the fact that there are so many plants to choose from. The chief cause of the wrong selection is the "follow-my-leader" spirit. Thus in different districts it is a common thing to find one or two kinds of hedges prevailing. It naturally follows that mistakes are perpetuated; or the reverse order may prevail and most of the hedges be rightly planted. The desire for something quick is responsible for many mistakes and future regrets. Nothing can be more ridiculous than planting *Pinus insignis* in positions where it must of necessity be closely restricted. A giant forest-tree will not permanently submit to such restriction, and, even while it still lives, it is hideous when so treated. *Cupressus macrocarpa* is for the same main reason unsuitable, though it does for a time make a nice hedge. With so many to choose from, why plant such unsuitable things? The first consideration should be the amount of space it is desirable the hedge should occupy; while the aspect, whether shady or sunny, should also be taken into account — if, for instance, the situation be very windy or near enough to the sea for plants to be affected by salt in the wind. Here I may say that wrong methods of trimming often cause hedges to cover more ground than is either necessary or advisable; but when one attempts to lay down a law about trimming, one is at once up against a very strong snag—individual taste, to wit. It is very generally acknowledged the world over that the correct form of hedge is wedge-shaped; the apex, of course, being at the top. The chief reason for this is that when in that form the sun shines more evenly on all its parts, and the lower branches extending farther out than any others are thereby strengthened; and the bottom of a hedge is always the weak spot. In actual practice, however, hedges so shaped are extremely rare not only in New Zealand, but everywhere. The reason is easily found. It is because in the opinion of most people they are the least ornamental. A flat or a round top most folk will have, and certainly a hedge is more showy when so shaped, and that is

usually the wish of the owner. Who, therefore, has the right to say it is wrong? But some qualification of the last statement is necessary, for if a hedge is too broad in proportion to its height, no evenly clipped top—round or any other shape—will prevent it being ugly to the eye of any one with the artistic faculty in the least degree developed.

The breadth of a hedge should be in proportion to its height, and in all respects in harmony with its surroundings. An ox in a parlour would look almost as well as a large hedge—large either in height or breadth—in a small garden. I have in mind a number of places made sombre-looking by hedges that are too high for the space they enclose, and I dislike them no more than those that are too broad. The tall hedge overshadows its small domain, the broad one encroaches and encumbers the ground. When a small garden is to be enclosed, and some space is to be planted with shrubs, &c., the hedge should be trained up to narrow limits, and at the top a width of from 6 in. to 9 in. is ample if finished with a slight rounding. If it is decided to have a flat top, it will not look well at that width; it should be a little wider. It may be well to say here that an actual wedge top seldom exists except for a short time after clipping. Possibly no plants but yew and box would continue long in that shape.

Hedges are planted for various reasons, and in places widely divergent. One set of rules is not suitable to all positions, and the best plant for one position may be the worst for another. The best way to trim a hedge of one plant may be bad for another species, or even for the same plant under different conditions. When a hedge is to be planted, as is often done, very close to a house, with only a path or little more between them, choose a plant with rather small foliage, and for a dull situation one with light-coloured leaves. Never plant in a double row if the place is small, for if you do you will not be able to keep the hedge narrow. Therefore, also, do not plant a variety that requires to be planted in double rows. At the moment I can only think of one plant that demands this—viz., *Eleagnus japonica*. A hedge of this planted in a single row will not stand against the wind. The double row is necessary for stability, and so is a considerable breadth. It is therefore quite unsuitable for small places.

The only purposes I can conceive that are served by planting double rows are those just mentioned and the gaining of strength and impenatrability. Except in the case of cattle-fences extraordinary strength is not required. Double rows are neither necessary nor advisable in the majority of cases, and it is a plan much too often adopted.

It will be asked, what is the objection? It is because it makes the hedge unwieldy in breadth with no gain compensating to offset that inconvenience. Double planting had doubtless its origin in older countries, where hedges were made to serve on the farms and other places to restrain sheep and cattle. There planting is frequently in treble rows—two of common privet with white thorn between. Privet alone would not be strong enough, and white thorn is slower in growth. The plan has been followed indiscriminately, and has been applied to plants that do not require it. A shrub that, planted by itself, will make a perfect bushy specimen will fill its place in a hedge better in a single line than double, as in the latter case it is only the outside branches that live. All the inside ones will be smothered, so what is gained? But the case is different with shrubs of a straggling habit, like eleagnus. Mutual support is required, and a firm base, only to be secured by double planting, is imperative. Hedges intended to act as cattle-fences are to be considered by themselves. Their purpose is to be useful rather than ornamental, though there is no reason why they should not ornament as well as be useful. The cost of trimming will naturally have a great deal to do with the ornamental part, for if the cost is great the hedge is not likely to be well looked after. A hedge that must be trimmed with shears is wrongly placed on an extensive farm—that is to say, if any considerable length of it is planted. For this reason *Eleagnus japonica*, though making an excellent hedge, should be barred. If trimmed with anything but shears it becomes an eyesore.

Boxthorn (*Lycium horridum*) makes a good hedge almost everywhere. I have heard that it will only succeed in dry situations. My own observations do not bear this out. There is, however, a serious objection to it. The spines are very strong and sharp, and make painful wounds on the feet of animals if pieces are left on the ground after trimming, and that easily happens. It is also a nasty hedge to trim because of these same spines. It can be trimmed with a slasher, but for that very reason it makes painful wounds on the workman, because of the force of blow necessary. Osage orange (*Maclura coccinea*) is in the same category as boxthorn, and the preceding remarks will almost exactly apply here.

Berberis vulgaris is a first-rate farm-hedge plant. For this purpose it should be planted in double rows, these being 10 in. to 12 in. apart, and the plants 24 in. to 30 in. apart in the rows. The rows should be planted in quincunx order, the plants in the second row being opposite the intervals in the first, so that cattle attempting to break through would have to charge through the heart of a plant.

For a farm fence of great length I consider the cherry-plum (*Prunus myrobalana*) to be superior to anything else. It is quicker in growth than any other properly so-called hedge-plant, can be trimmed with greater speed, can be made to be quite cattle-proof, and withal in a narrower space. This plant is not, like the barberry, dependent on a large number of thorny branches for its repellant powers, but its upright shoots are very stiff and strong. The old growth also becomes furnished with very formidable spines, adding largely to its strength as a cattle-keeper. These spines are quite absent from the young shoots, which would be cut off when trimming. Therefore they are a source of strength, with no drawbacks attending them. But a certain mode of procedure is necessary to make a perfect hedge of this plant, and it will not be satisfactory otherwise. The plants can be easily raised from cuttings, but it is not advisable to plant cuttings. They are best raised in a nursery and planted out at one year of age; and one-year-old plants are better than older ones. Plant in double rows as described for barberry. At the time of planting cut the plants back somewhat, just sufficient to make them neat and handy to plant. Let them run without trimming till the next winter. Then should come the most important work of all—that is, to cut them all down nearly to ground-level. The main object of the cutting-down is to induce the plants to send up a number of strong upright shoots from the bottom. Being now well furnished with roots, and being relieved of the growth they have made, they break into very strong growth, much stronger than if they had not been cut back, and the growth is of the right character and starts from the right place.

In connection with farm hedges I would like to see the Home custom, which does so much to make country lanes pleasant, adopted here—that is, the planting of mixed hedges. In England the hawthorn is most frequently used for hedges, but it is rarely planted quite by itself. Hazel, elm, ash, maple, birch, beech, and oak are employed, some or all of these being intermixed, those of arboreal habit being allowed here and there to lift themselves above the hedge and form trees, thus adding their charm to the scenery, giving shade and shelter to cattle and mankind, and yet not taking up one foot of land. Other plants also seen in hedge-rows are honeysuckle, clematis ("traveller's joy"), nightshade, and other wild plants. All these things are joys to humanity, and cost nothing.

Trees suitable for planting in a hedgerow, with the intention of allowing them to develop, are any species of an arboreal character,

with the exception of pines and cypresses or any similar conifers. For a hedge to succeed when partly shaded by trees it is essential that the trees be deciduous. Being bare of foliage in the winter allows the rain to reach the roots, and also gives a period of full exposure to light. Evergreen trees shut out light and prevent the soil beneath them becoming saturated with water. A number of trees were previously mentioned, but I would particularly mention also the lime or linden tree, planes, balsam, aspen, and black Italian poplars. For giving diversity to a hedge, but not with the intention of letting them grow to trees, most of the foregoing are more or less suitable, but more particularly so are silver and common birch, beech, hornbeam, and planes. Still better are the so-called flowering-cypress (*Tamarix gallica*), and the sallow or palm willow (*Salix caprea*). The last-named is especially valuable. Its growth is upright as regards the principal shoots, it is very quick-growing, and is quite indifferent to fierce winds.

Sometimes a hedge is handicapped by poor or insufficient soil, or water lying about it in wet weather. Here again the Home custom might with advantage be followed, or followed as nearly as possible. Usually the word "hedge" is in the Home-country synonymous with mossy banks, where wild violets and primroses grow. That is because they usually raise a bank to plant the hedge on. Not infrequently a double ditch is dug and all the soil thrown up between the two, the hedge being planted on this bank of soil, which provides abundant rooting-room protected from an overplus of water. The cost of labour will perhaps prevent the adoption here of this plan in its entirety, but it is quite feasible to nearly approximate it by the aid of a plough. Indeed, I am sure it would be cheaper than digging a trench in tough grass by hand labour, and would certainly be better.

A hedge cannot be planted successfully in most places without preparing the ground some months before. If the soil is full of *Poa pratensis* it will take some time to kill this, and it is little use planting among its roots. In such cases the plough does good work. First turn two furrows towards each other, so that these may lie on the site of the hedge, then subsoil the same furrows and throw the loose stuff on to the first. This would provide sufficient soil to make killing the couch by a few harrowings or scufflings a comparatively easy matter.

The treatment of the young plants when they are put out is of considerable importance. When the number of plants to be handled is thousands, or even hundreds, it is quite impossible to treat them as one would a single choice shrub; nor is it necessary,

as the treatment they get is something of the rough-and-ready style; but that does not in the least matter if they are properly dealt with. If the plants are received from a nursery they may have travelled some distance, and the roots may be dry. They should be unpacked as soon as possible and heeled in a suitable piece of ground, not in bundles, but thinly distributed. They should be left almost lying on the ground, the roots being covered with soil firmly trodden. But if previous to heeling they be found to be very dry, lay the open bundles in a shady place and pour enough water on the roots to thoroughly wet them. Then cover the whole, top and root, with sacks, and leave them for a few hours before heeling. If the number is small, immerse the roots in a tub of water for an hour or so, but do not on any account water the soil; it is sure to be quite cold enough, and the warmer the better. It cannot be too warm at the season for planting. When the plants are lifted for planting they should be trimmed back to some extent. It is rather difficult to say how much should be taken off in all cases, but if a plant is straggling well down, always be sure that it is a gain, not a loss, to cut back, because the after-growth is sure to be stronger for it.

Sometimes shelter is wanted that is beyond the power of an ordinary hedge. It is not practicable to allow a hedge to get too high, for the cost of trimming becomes too great. In such cases conifers of some kind are generally planted. These are not always satisfactory. Indeed, I should not be far out if I said they very seldom are, for as soon as they get up a bit they get their tops cut off. Now, there is a tree that is eminently adapted to this very purpose—viz., to make a breakwind higher than a trimmed hedge, and yet occupy no more space—that will not outgrow the reasonable space that can be afforded it, and that will only require trimming at intervals of several years, and then only very little. The tree I mean is *Hoheria populnea*, one of the varieties of native lacebark. Its growth is very rapid, it is perfectly hardy, stands wind well, and is not particular as to soil. Unfortunately, plants are too expensive at present. Mainly, I suppose, because seed is not easily obtained very few plants are grown. They can be raised by cuttings, but the process requires some skill, and it is slow—too slow for cheapness. I believe it would be good for the country if some one would take it in hand to plant as many as possible for seed purposes. Nothing grows more freely from seed, and when once the trees begin to seed they bear it in profusion. I know of a small grove that was planted years ago in a garden in a proverbially windy place. It gives splendid shelter, and I have seen thousands of seedlings self-sown beneath the trees.

FOWL-POX.

H. A. Reid, F.R.C.V.S., F.R.S.E., D.V.H.

During the past month a rather severe outbreak of fowl-pox came under observation. As this seems to be the first occasion on which this trouble has been officially recorded as occurring in New Zealand, it may perhaps be of interest to readers of the *Journal* to become acquainted with the nature of the disease, its treatment, and prevention.

Head of Affected Fowl.
[From the *Journal of Comparative Pathology and Therapeutics.*]

Fowl-pox, avian variola, sore head, or warts, as it is familiarly termed, is a disease affecting birds, particularly fowls, turkeys, geese, and pigeons. It is known technically as *Epithelioma contagiosum.* Fowl-pox, as the name indicates, assumes the appearance of the so-called poxes or skin-eruptions affecting other animals and man, but it has no further relation to these, being a specific

affection confined solely to birds. It attacks most generally the unfeathered portions of the skin, such as the comb and wattles of poultry, and is characterized by the appearance of a number of wart-like outgrowths or excrescences, frequently covered, especially in the initial stages, with a dark-brown scab. These outgrowths may extend on to or appear also on the skin round the eyes, the openings of the ears, nostrils, and angles of the mouth. Occasionally the lesions make their appearance on the feathered portions of the head and neck, the thighs, and under-surface of the wings. The disease may also sometimes involve the eyes, mouth, and throat. In the latter case the appearance is strongly suggestive of avian diphtheria or roup. When the mouth parts are attacked there is profuse salivation and gaping on the part of the affected bird. It may be unable to eat or breathe, and death may supervene owing to mechanical obstruction to either of these functions, or to a general state of wasting and malnutrition brought about by this condition. This class of case furnishes a high mortality. Speaking generally, however, fowl-pox may be viewed as a comparatively benign affection. The lesions are usually confined to the comb and wattles, and the affected birds recover after four or five weeks, thereafter becoming immune to further attacks. During the progress of the disease the subject experiences a good deal of pain and inconvenience. The lesions are inclined to bleed when they are accidentally knocked off or scratched at by the bird, or when they are being manipulated for purposes of examination or treatment. Their removal leaves exposed a dirty, grey, mattery, and sometimes bleeding under-surface. This soon heals, and a grey warty-looking excrescence remains. This gradually becomes paler in colour, and is finally absorbed into the surrounding tissue, leaving perhaps a very faint scar marking its former situation. When the mouth parts are invaded the first change observed consists of reddening and swelling of the inside lining, which later becomes yellowish-coloured, and undergoes degeneration into a cheese-like material. A whitish-yellow inflammatory exudate is also seen to cover the tongue and throat, giving the appearance of the "false membrane" characteristic of diphtheritic roup. The two diseases—*i.e.*, fowl-pox and diphtheria*—may therefore easily be confused, but, as already stated, they have no connection with each other beyond the superficial appearance of certain local manifestations. At the same time it is possible for both diseases to occur together. Avian diphtheria runs a chronic course, whereas fowl-pox has a definite period for

* An account of the latter disease has already appeared in the *Journal*. See "Avian Diphtheria," Vol. vii, No. 3, September, 1913, p. 247.—ED.

development and decline. The blood of birds affected with fowl-pox is infective, and will reproduce the disease when inoculated into other healthy birds. This is not the case in diphtheritic disease. Birds which are opened for examination after death from fowl-pox show only the lesions already described, although exceptionally the disease has been known to extend and involve the gullet and bowels. In avian diphtheria the gullet and bowels are frequently the seat of disease.

The actual cause of fowl-pox appears to be a very minute micro-organism present in the infective material from the site of the disease and in the blood of affected birds. So small is this organism that it cannot be distinguished under the highest powers of magnification, while it is capable of passing through the pores of an ordinary Berkefeld filter. Notwithstanding its minute characteristics, the virus of fowl-pox is very resistant to the actions of heat, light, and chemical agents as compared with other bacteria of the same class. The infective material present in the warty growths will resist a temperature of 140° F. for one hour and a half, or steaming for one hour at 212° F. The scabby material will also resist the action of the natural elements (air and sunlight) for over two months. Carbolic acid in the proportion of 2 per cent. destroys the virulence of the organism in half an hour, but dilutions higher than this have no such effect.

Contagion.

Fowl-pox is generally set up in a flock by the introduction of an affected bird, or one which has not fully recovered from the disease. The purulent matter present on the under-surface of the scab is highly infective, and the disease is conveyed from bird to bird by direct contact or by picking up portions of the scabby material shed by the affected fowls. The common drinking-trough is also a likely source of infection. It is readily transmitted experimentally by lightly scratching the comb of a healthy bird, and rubbing on to it some of the matter from one of the virulent scabs.

Treatment.

This consists in the isolation or segregation of all birds showing symptoms of the disease. A temporary roost and run, away from the other buildings, should therefore be erected, and all visibly affected should be kept in it until the disease has run its course and all traces of it have disappeared. The remainder of the fowls should be inspected daily to note if there are any further cases. If any are discovered, these should be immediately removed

to the isolation-pen. The whole of the roosts should be thoroughly cleaned with hot water and soda, and subsequently disinfected, using for this purpose a reliable disinfectant such as Kerol or Izal in the proportion of one teacupful to a gallon of water. All litter should be scattered in the runs, lightly sprayed with kerosene, and set fire to. The runs should then be dug up and top-dressed with lime. Individual birds may be treated by painting over the diseased parts a solution of one part of tincture of iodine in ten parts of water with a stiff brush. This application should be made once daily. All utensils should be thoroughly scrubbed and boiled. To avoid the introduction of fowl-pox into the poultry-yard fresh arrivals should be carefully examined for any signs of the disease.

WINGED THISTLE (CARDUUS PYCNOCEPHALUS).

IN looking over some plates illustrating various weed pests in a late issue of the *Journal* I noticed that of the winged thistle. My experience of this plant, on pastoral land having a clay soil and not ploughable (old forest at one time), may be interesting. After a few years the grass on such country will begin to deteriorate. More especially will the rye-grass disappear before the incoming danthonia. At this stage the benefit of thick areas or masses of winged thistle is demonstrated. It gradually spreads over the land in patches, and will be in great luxuriance of growth during summer. It becomes a mass of dry stems in the autumn, and is then good feed for sheep. It is especially liked by Angora goats, which are unable to eat much of the plant when green on account of its prickly nature. But the greatest benefit derived from the dense islands of this thistle, when growing nearly 3 ft. in height, is that it prevents animals from grazing that portion of land, so leaving the better grasses to go to seed and give a new life to the pasture. The soil will also be enriched by the added humus derived from such parts of the thistle as may remain uneaten by the stock, and also from the decaying roots. In late autumn and winter the grass follows the thistle in great luxuriance, and although for some years I had men destroying this newcomer, I now consider it of great utility to certain pasture lands.—*Taylor White, Hawke's Bay.*

Devote whatever space can be spared to trees. These more than pay for the ground they occupy in protective value, to say nothing of the timber they will yield.

POTATOES.

VARIETY TESTS AT RUAKURA.

A. W. Green.

As in previous years, the conditions under which all varieties of potatoes were grown at the Ruakura Farm of Instruction were made as nearly equal as possible. Any variations, therefore, in the resultant crops above or below a fair average depended on the extra vitality or weakness of the variety itself. These variations will be found to range considerably from high to low, even to such an extent that the choice of the variety alone would mean either a successful crop or a total loss. It must be remembered that the past season was not at all favourable for early-planted potatoes. The continuous rains from the last week in November until Christmas hindered spraying operations. It was during this period that blight became prevalent throughout the district. Later-planted crops escaped, consequently they received no check and yielded more heavily. Although blight affected the haulms to a certain degree before there was an opportunity to apply the second spray, the disease did not attack the tubers. On two occasions spraying-work was suspended owing to rain. The potatoes, however, continued to grow until well into February, and when dug yielded a much heavier crop than was at first anticipated. Nevertheless, with most varieties the percentage of small tubers rose above that of last year.

This season the potatoes followed an oat crop, whereas the previous season's experiments were conducted on land worked up from lea. The land was well prepared, being ploughed in the fall and left fallow during winter. It was ploughed again in August, then rolled, cultivated several times, and tine-harrowed. The potatoes were planted from the 6th to the 10th October, in rows 27 in. apart, and in sets about 12 in. apart in the drills. The seed was also well prepared. For several months before planting the sets were sprouting in boxes in an open shed, so that the sprouts had become strong and well developed. The sets were planted direct from the boxes, and care was taken not to break off the crown chits.

The manure applied consisted of 3 cwt. of basic superphosphate, 3 cwt. of bonedust, 3 cwt. of Christmas Island guano, and 1 cwt. of

sulphate of potash per acre. To apply 10 cwt. of artificial manure to the acre may appear to many farmers an exceptionally heavy dressing. Visitors who have been specializing in potato-growing for many years state that, throughout the Auckland district at least, this dressing is none too heavy. The same is borne out by our own experience. There is no farm crop which will repay good treatment as well as the potato, and scarcely any which suffers more through neglect. The potato benefits immediately by good culture, and no other crop will give such increased returns for one season's labour.

Immediately the tops showed through the ground sufficiently to indicate the rows the single-horse cultivator was put through, and several similar cultivations followed at intervals during the growing period.

Three sprayings were applied, the spray being Bordeaux mixture, used at a strength of 4-5-50. The dates of cultivations and sprayings were: First cultivation, 6th November; second cultivation, 18th November; first spraying, 22nd November; third cultivation, 25th November; second spraying, 5th December; fourth cultivation, 6th December; moulded up, 8th December; third spraying, 30th December.

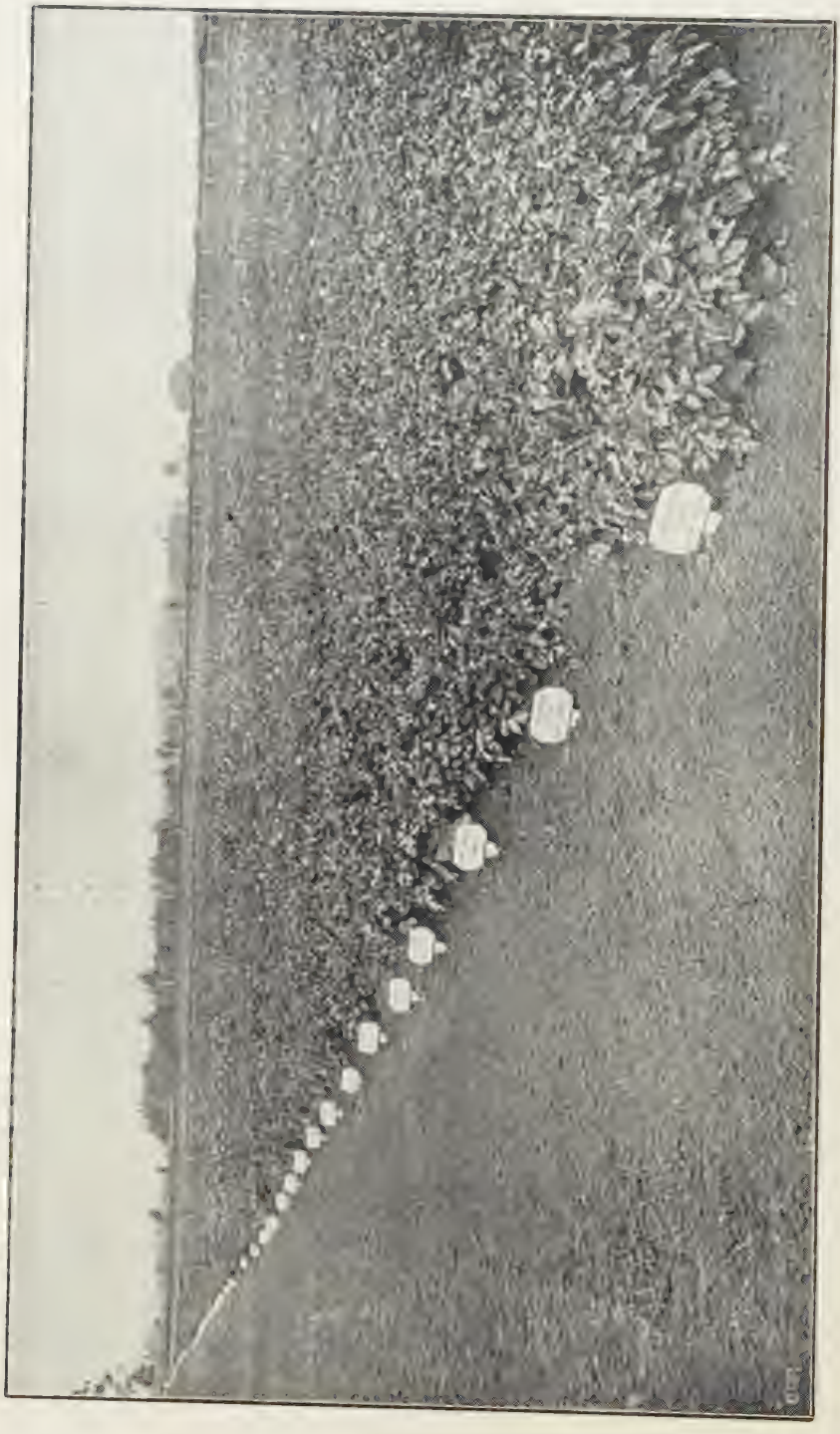
The crop was lifted during March, 1914, being dug with the fork in preference to ploughing. This was considered advisable in order to carry out a selection of roots which was deemed necessary. When digging, seed was reserved from those roots only showing heavy productiveness and strong vitality. Apart from any amelioration in productiveness which may be brought about by this method, it gives further opportunity for improving the shape, size, and quality of tubers. Further, it renders possible the elimination of those undesirable roots which diverge from the true type which characterizes the variety. It also affords better facilities for detecting rogues, which unavoidably get mixed in the handling of so many varieties. Although an endeavour to reduce the number of varieties is made annually, a certain number of new ones are introduced from time to time, and this interferes with the elimination process.

Several of the new varieties gave very good returns for their first trials, and the following call for special attention: Maori Chief, for its blight-resisting properties; Queen of the Veldt, for its fine quality and heavy yield; Rubicund, for its blight-resisting properties and yield.

The letter D alongside a variety signifies that it is to be discarded on account of one or more of these reasons: (i) poor yield, (ii) weak vitality, or (iii) susceptibility to diseases.

Variety.	Yield per Acre in Tons.			Variety.	Yield per Acre in Tons.		
	Large and Seed Size.	Small.	Total.		Large and Seed Size.	Small.	Total.
Abbey Craig D ..	4·88	3·51	8·39	Late Rose	11·49	1·64	13·13
Acme	7·72	1·19	8·91	Langworthy	6·87	6·50	13·37
Adriondack	6·58	2·11	8·69	Lord Roberts	8·33	2·91	11·24
Albans Early Pink D ..	5·06	4·33	9·39	Magnum Bonum ..	7·10	3·16	10·26
Alpha	12·54	1·87	14·41	Marche's Favourite ..	7·00	2·37	9·37
Ashleaf Kidney ..	6·68	3·39	10·07	Maori Chief	9·80	5·75	15·55
Beauty of Hebron D (*a*)	..	..	..	Mannel's Blight-proof ..	6·32	2·44	8·76
Bessie Plaides D ..	5·41	3·28	8·69	Millionmaker	6·70	5·75	12·45
Bismarck	6·41	1·12	7·53	Motor	7·50	3·12	10·62
Bountiful	10·27	3·73	14·00	Monarch D	2·87	4·07	6·94
Bobbies D	3·42	2·72	6·14	Myatt's Prolific D ..	4·53	4·35	8·88
Bread-fruit D ..	3·83	2·60	6·43	McAleiter's Seedling ..	7·93	2·81	10·74
Britannia	6·74	1·05	8·24	New Colonist	7·68	2·65	10·33
British Queen ..	7·09	1·71	8·80	Northern Star ..	8·46	6·31	14·77
Brownell's Beauty ..	6·37	2·61	8·98	No Surrender	7·53	2·39	9·92
Brown Rivers D (*b*) ..	..	..	..	North Pole	9·37	3·75	13·12
Burbank D (*c*)	..	..	..	Orange Blossom ..	6·12	2·81	8·93
Challenge Victorian ..	6·70	1·12	7·82	Peckover	7·66	5·36	13·02
Cliff Kidney D ..	5·62	1·68	7·30	Pride of Tonbridge D (*e*)	..	..	..
Commonwealth ..	7·43	3·93	11·36	Princess Victoria ..	7·46	2·87	10·33
Commercial	9·38	2·80	12·18	Prince Regent ..	10·63	3·73	14·36
Conquering Hero ..	8·21	1·68	9·89	Purple Kidney ..	6·28	5·39	11·67
Conquest	11·96	3·28	15·24	Puritan	8·35	1·86	10·21
Coronation	12·31	3·73	16·04	Queen of the Veldt ..	9·85	4·03	13·88
Cow	6·53	4·03	10·56	Quarantine No. 7 ..	8·33	2·61	10·94
Dakota Red	9·48	2·56	12·04	Red Rocks	8·73	5·03	13·76
Dalmenney Hero ..	6·23	3·69	9·92	Red Skins D (*b*) ..	..	..	..
Dalmenney Beauty ..	6·60	5·52	12·12	Red King	5·47	3·35	8·82
Dalmahoy	10·95	1·74	12·69	Radium	9·50	3·36	12·86
Daniel's Defiance ..	8·75	2·68	11·43	Royal Kidney ..	7·25	4·62	11·87
Daniel's Sensation ..	10·21	3·42	13·63	Royal Purple D ..	5·71	5·03	10·74
Discovery	8·00	1·62	9·62	Royal Ashleaf D (*f*) ..	..	..	..
Diamond	10·21	2·89	13·10	Roundheads	7·49	1·87	9·36
Dickson's Round Seedling D (*d*)	..	..	..	Ruby Queen	8·62	2·62	11·24
Duke of Rothsay D (*e*)	..	..	..	Robin Adair D ..	4·60	3·12	7·72
Duke of York D (*f*) ..	..	..	..	Runciman's Purple ..	10·50	2·00	12·50
Duchess of Cornwall D (*f*)	..	..	..	Russell's Perfection ..	7·37	4·72	12·09
Duke of Albany ..	9·50	2·50	12.00	Rubicund	9·50	4·42	13·92
Duchess of Buccleugh ..	4·85	4·66	9·51	Schoolmaster	9·57	2·40	11·97
Dalmenney Acme ..	8·41	3·72	12·13	Scottish Triumph ..	8·62	1·91	10·53
Dobbie's Favourite ..	11·93	1·66	13·59	Scotia	10·47	6·16	16·63
Dalhousie	7·39	2·05	9·44	Sharp's Victor D (*e*) ..	..	..	..
Early Norther D ..	2·75	4·12	6·87	Sir Walter Raleigh ..	8·25	1·59	9·84
Eldorado	7·01	3·92	10·93	Snowflake	11·68	2·50	14·18
Empress Queen ..	5·98	4·00	9·98	Snowdrop	7·66	1·91	9·57
Evergood	7·63	4·79	12·42	Solanum Commersonii D(*h*)	..	..	..
Evelyn	6·98	4·03	11·01	Southern Cross ..	10·92	3·73	14·65
Excelsior	7·64	3·47	11·11	Skerry Blue	8·25	3·75	12·00
Factor	6·71	2·05	8·76	State of Maine ..	9·69	2·51	12·20
Federation	11·14	2·58	13·72	Spark's Victoria D (*a*) ..	..	..	..
Findlay's Challenge ..	5·91	1·66	7·57	Supreme	11·78	3·73	15·51
Findlay's Aurora ..	7·12	2·50	9·62	Sunrise	10·08	2·31	12·39
Findlay's Rosabelle ..	6·36	2·08	8·44	Syon House Prolific ..	5·25	1·62	6·87
Flounders	6·87	2·50	9·37	Star of New Zealand ..	8·05	2·30	10·35
Fifeshire Beauty ..	9·59	2·72	12·31	Teneriffes	12·50	1·86	14·36
Fitche's Early	6·21	1·59	7·80	The Bruce	10·11	2·98	13·09
Gamekeeper	8·84	5·07	13·91	The Scott	9·64	2·09	11·73
Gamekeeper (autumn-grown seed)	9·05	6·21	15·26	Up-to-Date (Crockett's)	11·13	2·05	13·18
Gem of the South D (*g*)	..	..	..	Up-to-Date (Southern) Unknown D (*e*)	9·14	2·61	11·75
Gold Coin	10·51	3·50	14·01	Victoria Elba	..	..	..
Good Luck	8·07	2·76	10·83	Victor Rose	8·66	3·28	11·94
Guernsey Snowflake ..	4·99	4·75	9·74	Waeroma Red ..	11·12	2·61	13·73
Hobarts	8·05	4·71	12·76	Waitotara Beauty D (*f*)	8·74	2·12	10·86
Honey Rose D ..	3·25	1·43	4·68	Warrior	..	..	..
Ivanhoe D	3·51	2·46	5·97	W. P. Blow	7·31	2·68	9·99
Invicta D	4·78	5·36	10·14	White American ..	11·37	3·00	14·37
Irish Flourball ..	7·72	2·31	10·03	White Empress ..	8·57	2·46	11·03
Irish Queen	6·56	5·75	12·31	White Rocks	9·04	2·09	11·13
Irish Rocks	6·34	4·66	11·00	White Elephant D (*g*) ..	6·89	2·87	9·76
King Edward VII ..	6·30	1·17	7·47	Windsor Castle ..	..	..	..
					7·28	3·06	10·34

(*a*) Discarded at planting-time owing to weak eyes. (*b*) Discarded at planting-time owing to weak vitality. (*c*) Discarded at planting-time owing to prevalence of brown-rot. (*d*) Discarded at planting-time owing to weak sprouts. (*e*) No crop (blighted). (*f*) Discarded at planting-time. (*g*) No crop. (*h*) Discarded at planting-time on account of uneven shape.



S. B. Taylor, photo.] THE POTATO-PLOTS OF LAST SEASON AT THE RUAKURA FARM OF INSTRUCTION.

RESULTS OF MANURIAL TESTS.

For the manurial tests the Up-to-Date variety was used. The manure used was a combination of the following manures, mixed in these proportions: 3 cwt. bonedust, 3 cwt. basic superphosphate, 3 cwt. Christmas Island guano, 1 cwt. sulphate of potash. The plots were thus treated: Plot 1, no manure; plot 2, 2 cwt.; plot 3, 4 cwt.; plot 4, 6 cwt.; plot 5, 8 cwt.; plot 6, 10 cwt.

Following were the percentage results:—

Plot No.	Rate of Manure per Acre.	Large and Seed Size.	Small.	Total.
1	No manure	1·66	2·05	3·71
2	2 cwt.	4·48	1·60	6·08
3	4 cwt.	7·16	2·24	9·40
4	6 cwt.	7·01	2·38	9·39
5	8 cwt.	8·36	2·99	11·35
6	10 cwt.	9·85	3·58	13·43

There was a gradual increase in yield due to manure, except in the case of plot 4, where the total result was practically the same as in plot 3.

Some authorities maintain that a heavy application of basic slag alone will not only give a good yield but also prevent blight. An experiment was carried out to demonstrate the value of this contention. One plot, manured with 10 cwt. of basic slag per acre and unsprayed only yielded a total of 2·7 tons per acre. Another plot, manured in a similar manner but sprayed with Bordeaux, yielded only 3·4 tons per acre. The sample in each case was very poor.

In the 1911–12 season 150 farmers co-operated with the Department in the testing of lucerne in their respective districts. In the 1912–13 season the number had increased to 412, and last season 458 farmers participated in the lucerne-extension campaign.

In the catch-crop of turnips sown in No. 5 (manurial test) paddock at the Ruakura Farm of Instruction the most striking feature is the absolute failure of the "no manure" plot. The seeds germinated, but the plants died off almost as soon as they showed above ground. The best plot at present is that manured with a complete fertilizer, and the worst of the manured plots (as in the case of the swede crop) is again that fertilized with blood and bone.

THE SOYA BEAN.

EXPERIENCE AT MOUMAHAKI EXPERIMENTAL FARM.

W. STANLEY HILL, B.Agric., N.Z.

THE failure of several attempts made to grow this crop under field conditions at Moumahaki Experimental Farm led to consideration of the cause or causes of these failures. In previous seasons only one variety of bean — viz., the Early Yellow — was experimented with. During the season just passed six varieties have been fairly successfully grown under severe field conditions. They were sown on the 20th September, 1912. The varieties were,—

—	Average Height.	Period of Growth.	Colour of Seed.	Weight per 100 Seeds.
	Inches.	Days.		Grams.
Giant Yellow Santa Margherita	36	230	Yellow	28·56
Early Yellow	18	175	,,	24·60
Green Samarow	20	209	Green	15·34
Arlington	36	215	Black	10·58
Brownie	24	202	Brown	9·14
Meyer	33	209	Black	7·10

All the varieties germinated well and made rapid growth during the hot dry months of January and February. At this time the varieties began to differentiate themselves. The Early Yellow was first in flower, and the pods were well set before many of the other varieties were in full bloom. Early yellow is essentially a bean-producing variety, while Arlington, Meyer, and Brownie appear to be more suited for forage purposes. Giant Yellow Santa Margherita and Green Samarow might be utilized for either forage or seed.

Secondly, it was noted that the Soya bean was a very shy germinater, while it was considered that field crops may have been sown too deeply. Experiments at the University of Wisconsin, U.S.A., demonstated that the decomposition of clover, used as a green manure, had a marked detrimental effect on the germination of cotton-seed and of linseed, but did not exhibit any material effect on the germination of maize, wheat, and clover. It was thought that the decomposition of green manures resulted in a reduction of the oxygen-supply and an increase in the carbon

dioxide present in the soil atmosphere. It was suggested that this change in the gaseous content of the soil may have prevented the germination of the cotton and linseed, which contain a high percentage of oil, and so require more oxygen for germination than such seeds as maize, wheat, and clover. When it was found that under field conditions the germination of the Soya bean had been unsatisfactory when sown by an ordinary grain-drill at a depth of from 2 in. to 3 in. and then rolled, it was considered that this poor germination was partially due to lack of oxygen. The Soya bean, which contains 17·5 per cent. of oil, would require more oxygen than most other seeds at the time of germination. The practice of shallow sowing and omitting to roll after sowing has been followed. The use of the New-Zealand-grown seed obtained from the Tauranga Experimental Farm has also conduced to better results, the locally grown seed showing a higher germination than imported seed.

Until the season 1912–13 no nodular developments existed on any Soya-bean plants harvested at Moumahaki. During that season these nodules were obtained by means of a commercial culture. Since then inoculation has been obtained by means of soil taken from around those plants having nodular developments. Preliminary experiments comparing plots inoculated with this soil and uninoculated have not shown any advantage to the former either at Ruakura Farm of Instruction or at Moumahaki. A test on similar lines undertaken by Mr. W. J. Arundell, at Patea, exhibited a difference in favour of the inoculated plot. Further experiments in this direction are required.

The Soya bean is widely cultivated in Manchuria, which country is said to have a severe winter followed by a short, warm, but humid summer. The bean has been largely exported to the United Kingdom, where the oil is extracted and the cake used for replacing decorticated cotton cake as a concentrated stock-food. The following analyses, by J. A. Voelcker, give an indication of the high nutritive value of both the bean and the cake:—

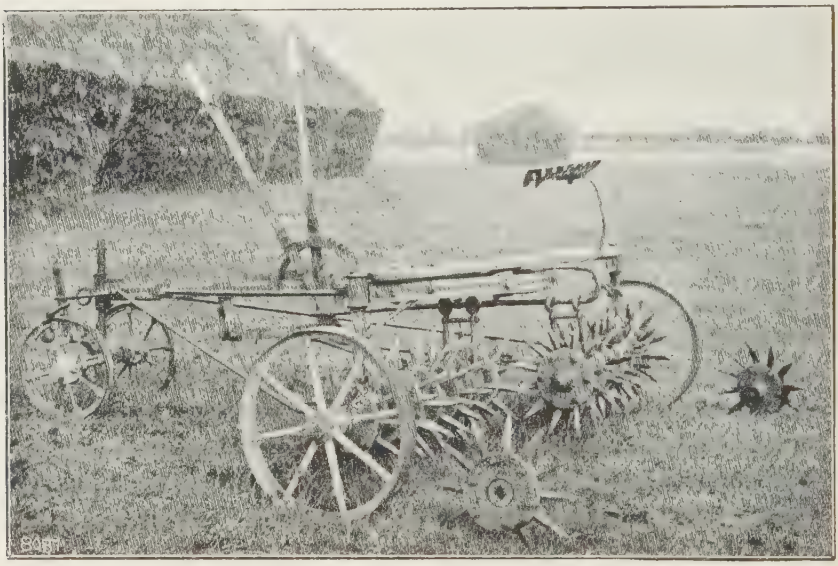
	Soya Bean.	Soya-bean Cake.
Moisture	10·41	11·40
Oil	17·47	6·12
Albuminous compounds	40·50	42·78
Starch, digestible fibre, &c.	22·38	28·41
Woody fibre	4·21	5·70
Mineral matter (ash)	5·03	5·59
	100·00	100·00
Containing nitrogen	6·48	6·85

The cabled reports of the successful production of artificial milk from the Soya bean and of its medicinal value make this plant of

further interest. The value of the bean cake or meal as a concentrated foodstuff may be more appreciated, but the import duty of 20 per cent. makes the use of imported material somewhat costly. There may be parts of New Zealand where the Soya-bean crop may take its place in the economic utilization of the land. As larger quantities of acclimatized seed become available this bean will be deserving of wider experimentation. It is wished to emphasize that the growing of the Soya bean as a farm crop is still in the experimental stage at this farm.

A WEED-ERADICATOR.

The accompanying illustration is that of an Australian implement, especially made for lucerne-cultivation, in use at the Ruakura Farm of Instruction. The surface soil is stirred to a depth of 5 in. or



C. E. Cuming, photo.]

6 in., all weeds being at the same time forked out. The lucerne, because of its strong tap-root, is unharmed. The implement should not be used until the lucerne is a year old.

Neat work on the farm is not only a source of pleasure but is generally profitable.

DYNAMICS OF A PLOUGH.

James Keir.

The direction of the various forces at work in drawing and resisting the plough are in general little understood. The result is that, though a plough is one of the simplest of machines, implement-makers have probably more trouble over the ploughs they make than they have over all their other lines of manufacture. These troubles are multiplied by the great divergence in soils, as to both type and condition, to be dealt with, the varying depths and widths of furrows ploughed, and by the different methods adopted for the yoking of the horses and the variation in the number of these employed.

In endeavouring to explain the dynamics of a plough I shall in the first place, for the sake of simplicity, deal with a single-furrow lever plough of the New Zealand type, having three wheels, as shown in Fig. 1, and shall assume that it is being used in ploughing lea land in good, firm condition, and that the furrow is 11 in. wide by $6\frac{1}{2}$ in. deep.

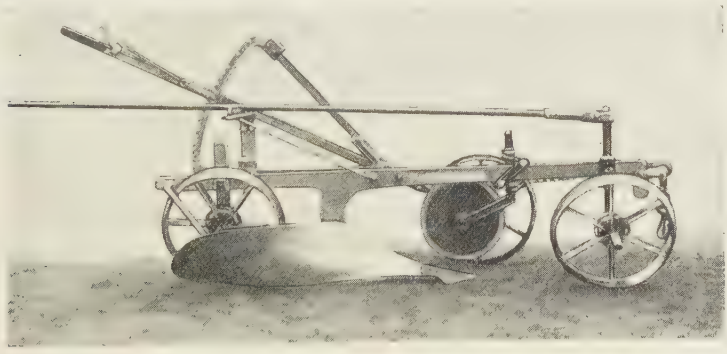


Fig. 1.

New-Zealand-pattern Single-furrow Lever Plough with Three Wheels and Circular Coulter.

A plough may be considered as a kind of a planing-tool, the share and coulter forming the cutters, these shearing off from the ground a ribbon of soil—the furrow; the mouldboard and the upper surface of the share combined forming a twisted wedge whereby this ribbon is rolled over, firstly on its lower right-hand corner

until it has completed a quarter of a revolution and reaches the vertical position as shown in Fig. 2, and, secondly, by rolling it

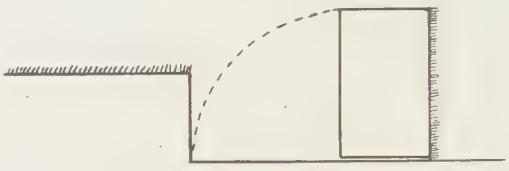


FIG. 2.
Cross-section of Furrow at Vertical Position.

still further over upon what was originally its right-hand upper corner till it lies at an angle shown in Fig. 3.

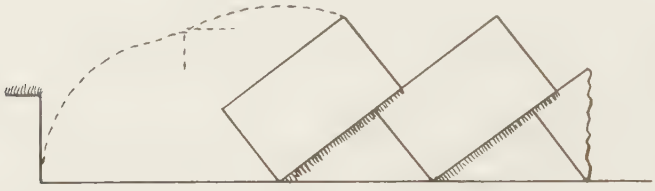


FIG. 3.
Cross-section of 11 in. by 6½ in. Furrows in Final Position.

The resistances to the above work are many, but the three principal are—(1) That of the coulter making the vertical cut; (2) that of the share cutting off the sole of the furrow; and (3) that of the mouldboard, which lifts, stretches, and rolls the furrow over until it falls by gravity into its place against the preceding furrow at the angle incidental to its depth and width.

The circular coulter, having to cut through the tough roots near the surface from the solid, opposes the advance of the plough when at work by an upward and backward thrust. The proportion of the total draught of the plough required to overcome this resistance (resistance = a force acting in opposition to another force) is probably about 20 per cent. The share is also a cutting-tool, but as in this case it is 6½ in. below the surface it meets with fewer roots than the coulter. In addition to cutting the sole of the furrow the share acts as the advance guard of the "twisted wedge," and it has to lift about 50 per cent. of the weight of the furrow some 3½ in. or 4 in. until it reaches the forward end of the mouldboard. The share opposes the advance of the plough when at work by a thrust backwards, downwards, and to the right. A fair estimate of the share-resistance is 40 per cent. of the total draught, leaving another 40 per cent. to the mouldboard in raising,

twisting, stretching, and pushing over the furrow. The mould-board's pressure in opposition is backwards, downwards at the front, and to the left throughout the remaining length. These proportions are estimated only; there are no means of separating them to ascertain their actual amounts. *Their relative amounts will vary largely under different circumstances.*

The question to be considered is the best position and direction to apply the force to overcome these three several resistances. To do so it is necessary to reduce them to one single resistance and fix approximately the position and direction of this. Under the laws of dynamics (force in motion) any number of forces or resistances (components) acting on a solid body and differing in magnitude and direction may be resolved into a single force or resistance, the position, magnitude, and direction of which is fixed by the magnitude and direction of the several components.

In Stephens's Book of Farm Implements, dealing with this subject, published in 1858, the point of resultant resistance—that is, the final resistance arrived at on combining the several resistances in operation—of a plough is called the "centre of gravity." As, however, gravity is not the principal cause of the resistance of a plough, I prefer to call the point in question the "resultant centre of resistance and point of bala ıce." By this is meant the imaginary point in the body of the plough from which a single force, acting horizontally to the said point and parallel to the land side, will overcome the resistance with a minimum of loss. If the force be applied obliquely to the said point the direction of the plough will not be altered, but the plough will advance in echelon to and parallel with the said force. The word "echelon" may be better

B=Force acting in echelon, parallel to beam.

understood by recalling the drawing of a barge in a canal by a horse walking on the bank. This point, then, from the estimate already made of the components of resistance, I place approximately in the plough we are considering at 15 in. to the rear of the point of share, 2 in. up from the base line of plough (which is a straight line from the point of share to tread of back wheel), and 3 in. to the right of the land side of the plough, looking from the rear of the plough. To ascertain the precise position is not essential to the argument.

It should here be noted that this imaginary point when a plough is at work is not a fixed point, but is constantly on the move from side to side and up and down, due to the variation in intensity of the three components caused by the varying composition of the land being ploughed; but under ordinary circumstances it will be fairly steady within an inch or two of the position stated. It is not possible to apply the force required to overcome the resultant resistance at the best theoretical position—namely, in a line horizontal with the said point and parallel with the land side of the plough—owing, firstly, to this line passing through the earth in front of the plough, as shown in Fig. 4, and, secondly, to the fact that the hame-hooks of a horse are about 4 ft. above the surface of the ground.

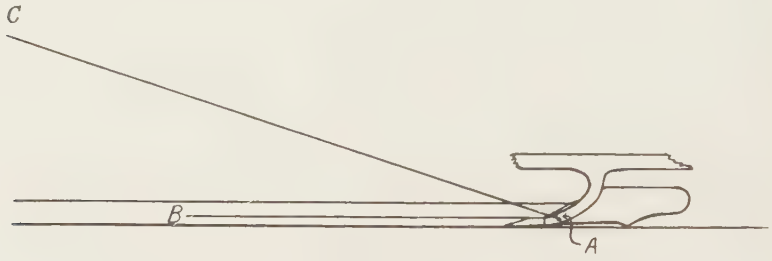


FIG. 4.

A. Centre of Resistance and Point of Balance.
B. Best Theoretical Position for Line of Draught.
C. Hame-hook of Ordinary Draught Horse (4 ft. above surface and 14 ft. from A).
AC. Straight Line from Hame-hook to Centre of Resistance.

For obvious reasons the power can neither be applied on the line AC nor on the line AB. It therefore becomes necessary to equip the plough-body with a beam raised high enough to clear both the furrow in front of the share and the ordinary surface growth on the land, and carried back from the share far enough to provide room for the front part of the mouldboard to join the share in a regular curve. These considerations fix the length and shape of leg and beam, which together form a straight shanked hook, the horses being attached to the end of the shank, the share and the mouldboard being joined to the returned curved end of the said hook. As the force has to be attached to the front end of the beam, and as force acts in a straight line, the power of the horses attached to the front of the beam crosses the gap between the point of the beam and the centre of resistance in a straight line. The leg and the beam must be made strong enough to resist the strain thereby set up in them, tending to straighten out the hook formed by the leg and beam.

The beam must not only be high enough to clear the furrow and strong enough to stand the strain, but must be long enough to bring the line of draught in a straight line from the hame-hooks to the centre of resistance, as shown in Fig. 5.

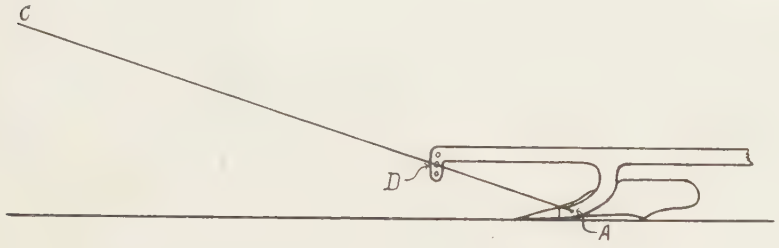


FIG. 5.

A. Centre of Resistance.
C. Hame-hook, 4 ft. above Surface and 14 ft. from A.
AC. Line of Force, and passing through Bridle-pin at D.

To permit the line of force being made a straight line to the centre of resistance under all circumstances, the beam at its point is fitted with a long bridle provided with pin-holes for lateral adjustment and movable up and down, so that the point of attachment of the team to the beam is adjustable in practically all directions. If the force could be applied on the line AB, Fig. 4, none of it would be wasted in doing useless work. As, however, it has—for the reasons stated—to be applied obliquely, as shown in Fig. 5, under the principles of the parallelogram of forces, out of the total power so applied only about 75 per cent. is applied to overcome the resistance and draw the plough horizontally forward, the other 25 per cent. acting to lift the whole plough vertically. In Fig. 6 the oblique force is decomposed into two components, one horizontal (AB) and one vertical (AE).

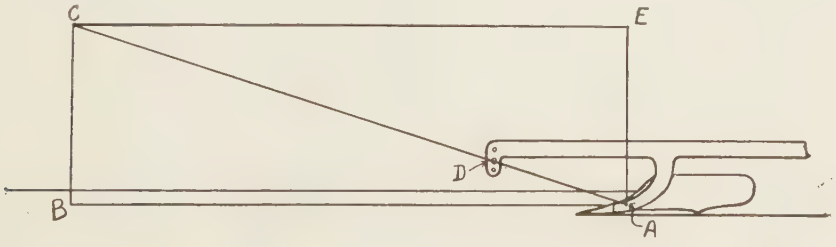


FIG. 6.

A. Centre of Resistance.
AC. Line of Draught, the Diagonal.
AE. CB. Parallelogram of Force.
AB. Force acting to draw Plough forward.
AE. Force acting to draw Plough upward.

The magnitude of the total force being represented by the length of the line AC (say, 540 lb.), the magnitude of the forces AD and AE is proportional to their length—in this case 14 to 4; the power therefore applied to draw the plough forward is 420 lb., and that to lift it vertically is 120 lb. It will be seen from this that, contrary to the ordinary opinion of ploughmen, the further the horses are away from the plough the less power will be required to draw it: as the parallelogram of force becomes longer it becomes narrower, and less of the total power is wasted in lifting the plough vertically—that is, AE becomes less and AB greater the further the horses are from the plough. It has to be noted that the centre A is also the balance-point, and that, theoretically, so long as the force is applied in a straight line to A, no matter what the obliquity of the line may be short of a right angle to the horizontal, the plough will run straight forward on a level keel, the force AE acting vertically to lift the plough by the balance-point, but wasting more and more of the total power as the angle of draught deviates from the horizontal. This, however, only holds true in actual practice within a small range for the vertical position of draught, and a still smaller range for the horizontal position. Should the bridle-pin be placed above the straight line from hame-hooks to centre of resistance, as in Fig. 7, as force acts in straight lines,

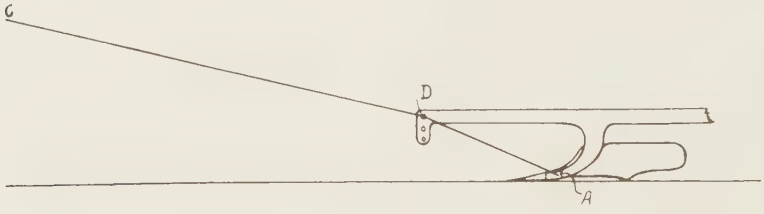


FIG. 7.

and as the direction of the draught is not now in a straight line to the centre of resistance, the plough will lift behind until the bridle-pin is lowered to bring the draught-line straight. If, on the other hand, the bridle-pin is below the straight line from hame-hook to centre, then for the same reason the plough will be lifted in front.

We have so far considered only the effect of different vertical positions of draught, but the same rules apply also to the horizontal position, the balance-point in the plough-body being the balance-point both for the vertical and horizontal planes.

In considering the effect of two horses yoked abreast we have to deal with two equal parallel forces, and the same laws hold good as those applied to the resistances. The resultant of two equal parallel forces is a single force midway between the two

equal components, and in magnitude equal to their sum; or, in other words, the two horses have the same result as if one big horse twice their power were yoked midway between them (see Fig. 8).

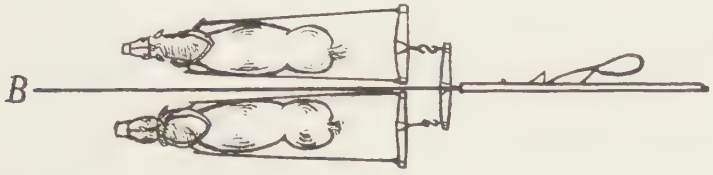


FIG. 8.
B. Resultant Force of Two Horses.

To draw the plough straight forward, then the force must make a straight line from the resultant point—namely, a point midway between the hame-hooks of the single large horse I have assumed as the resultant to the resultant centre of resistance. The bridle-pin must be on this imaginary straight line, for if it is too far to the right the back wheel will be drawn away from the standing land side of the open furrow, and if too far to the left the front wheel will be drawn away to the right, and the plough will be said to be scarce of "land."

If the force used to draw the plough were applied to a stud fixed to the top of a beam at a point vertical from the centre of balance, and all forces neglected save that to overcome the resistance to forward advance, the plough could be guided some distance to the right or left from the line of advance of the force in echelon thereto. If the team, being yoked to a fixed bridle on the point of a projecting beam, is moved to the right or left, the bridle-pin is at once out of the straight line from the final force to the centre of resistance, and the front end of the plough is then pulled round in the direction of the team until the resultant line of force is in a straight line to the resultant centre of resistance.

If instead of two horses abreast four horses are yoked, two in front of two, a new vertical resultant has to be formed as shown in Fig. 9.

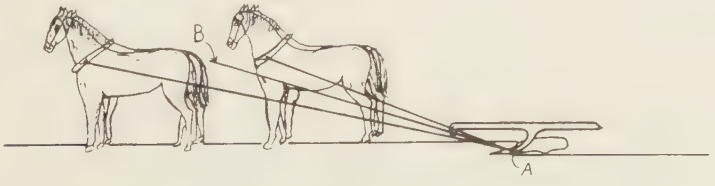


FIG. 9.
AB. Resultant Force of Four Horses, Two in front of Two.

This combination gives a resultant half-way between the front and back horses; it has the effect of requiring the bridle-pin to be lowered about 2 in. from the proper position for two horses. In the case of three horses abreast the resultant is shifted to the middle of the middle horse at his hame-hooks, and this entails shifting the bridle-pin about 6 in. or 7 in. to the left on the bridle.

As far as the horizontal position of the bridle-pin on the plough is affected by the number of horses and the manner of yoking, two horses abreast have the same effect as four horses, two in front of two. Six horses, three in front of three, have the same effect as three abreast. With five horses, two in front of three, the resultant on the horizontal plane is midway between that of four and six.

I have so far dealt with the single-furrow plough illustrated at the beginning of the article: in the case of ploughs having two or more furrows the resultant centre of resistance and point of balance has to be found as already explained for the whole plough (and a single resultant force for the whole team). In an ordinary double-furrow plough it will be about 15 in. farther back from the front plough than in a single plough, and $5\frac{1}{2}$ in. farther to the left than the position shown on Fig. 4 (see Figs. 9 and 10).

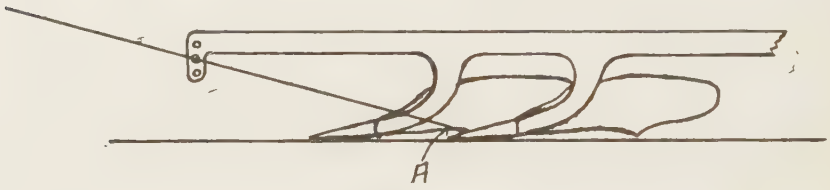


FIG. 10.
A. Resultant Centre in Double-furrow—Side Elevation.

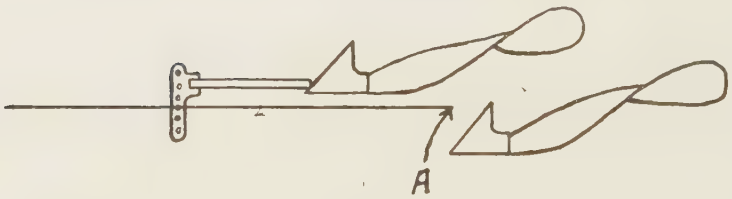


FIG. 11.
A. Resultant Centre, Double-furrow Plan.

In a three-furrow plough it is in the same position as on a single-furrow, but on the middle plough of the three. The resultant being farther back on double and three furrows, the front beams of these ploughs are shorter than those of single ploughs.

The above are the theoretical principles governing the application of power to draw ploughs, and they hold good under all circumstances and apply equally to all sorts, sizes, and number of furrows in a plough and to any number of or method of yoking horses. It must not, however, be forgotten that the position of the resultant centre of resistance varies under different circumstances, there being variations in the relative amounts of the three principal components. In loose land there will be very little coulter-resistance shifting the centre to the right; a fixed circular coulter set pointing to the left will shift it to the left, a worm share and coulter will shift it to the right, and a new share and sharp coulter will shift it to the left. A share with extra dip will lower the centre, while a wide, deep furrow will shift it to the right and lower it.

Practical ploughmanship consists largely in knowing what to do to adjust the resultant force of the team—that is, the power of the team to balance the shifting position of the centre of resistance, due to the things I have mentioned and to many others which may arise under the multiplicity of conditions under which ploughing has to be done. It is not always possible to shift the resultant force to balance an unusual position of the centre of resistance, but this centre of resistance may also be adjusted, and I will proceed to give a few hints of what to do to meet some ordinary difficulties.

Not enough dip.—See to the share; if it is worn bevelled on the under-side and is of steel, get it sharpened by a blacksmith; but if it is of cast iron, grind it bevelled on the upper surface or put on a new one. Cast shares are made by all makers with different amounts of dip, and can be got by ordering when required with more or less dip. If the share is in good order and more dip is still wanted, raise the bridle and shift the coulter—if this be circular—farther back. This is very necessary if the ground is hard on the surface, as a circular coulter, more especially when blunt, then becomes a wheel to hold the plough up out of the ground. Circular coulter-blades should always be ground sharp when worn blunt, but this is seldom done. In very hard or stony land straight-bar coulters should be used instead of circulars.

Too much dip.—Lower the bridle and shift the coulter. If it is circular forward, put on a share with less dip.

Too much land.—Shift the bridle-pin to the left, set the coulter to run off land, and shorten the couplings of the land horses.

Not enough land.—Shift the bridle-pin to the right and set the coulter to point more to the left. If it is a circular coulter and worn off land, get it ground, bevelling on the right-hand side to a

sharp edge, and put in the shank with the flat side to the left. Set the land-wheel to point to the left by packing it behind the square-holed washer—a short piece of fencing-wire will do. Bend the steering-rod just behind the knuckle-joint, to make the wheel run pointing more to the left. See that the share is not worn bevelled on the under-side. A share so worn reduces the land by making the plough run lighter on the wheels. The wheels are all set to run slightly to the left, and if the pressure upon them is reduced they lose their grip on the surface, and hence also there guiding effect. Widen the land horse's couplings and keep them farther to the left.

Seventy-five per cent. of the difficulties with New-Zealand-made ploughs are due to the use of shares not suitable for the particular purpose. A very common mistake is to use a share too wide. A share should, excepting under certain special conditions, be 2 in. or 3 in. narrower than the furrow which is to be ploughed. In dry, hard land the share should always be kept in good order, and it should always have sufficient dip. For hillside ploughing, more dip, a higher share-wing, fixed coulter (not swivels), and a different position of the mouldboard are required than for ploughing on the flat.

In conclusion, a great deal of misapprehension regarding the relative draught of light and heavy ploughs exists amongst farmers and ploughmen. The usual idea is that a heavy plough is much heavier to draw, and that the draught of a plough is proportionate to its weight. The real difference between the draught of a plough weighing 5½ cwt. and another weighing 7½ cwt. is the power required to draw the extra 2 cwt. on wheels on the particular piece of land being ploughed. By actual trial I have found this to be, on hard level land, 10 lb., the 5½ cwt. plough requiring 35 lb. to draw it, whilst the 7½ cwt. required 45 lb. On loose level land equal to a soft stubble paddock the difference was 20 lb., the 5½ cwt. plough requiring 70 lb. and the 7½ cwt. 90 lb. The draught of ploughs on level land running on wheels—as all the New Zealand lever ploughs do—is not appreciably affected by the dead-weight of the plough. The draught of every plough is almost entirely due to the work done on the furrow, and will vary with the width and depth and furrow, and condition and quality of the land. Whilst a light plough is easier to handle for the man, within reasonable limits and on level land, it makes hardly any difference to the horses.

In the State of California there are 160,000 acres in vineyards, representing a capital of £30,000,000 and providing employment to 40,000 persons.—*E. Clifton.*

ENSILAGE.

W. Dibble.

There are still many farmers who fail to appreciate the value of silage as a high-class feeding-material ready at hand for supplementing pastures in the colder months of the year, or during periods of drought, or in dry spells in the warmer months of the year. It is contended by many that the growing of green crops, such as green maize, oats, barley, and tares, &c., is more profitable than ensilage; but when the greater reliability of the latter and its availability just when it is required are taken into account its greater advantage must be obvious.

The University of Wisconsin (U.S.A.) recently conducted an experiment extending over three years to determine the relative economic value of maize silage against green feed in the supplementing of poor pastures and in keeping up a uniform and economical flow of milk. The result was in favour of maize silage, it being contended that by the use of this the cows will be in better condition to enter the fall and winter, and the annual profits for the year will be increased. "Green crops of good quality yield approximately a similar production of milk as does corn silage," says the report of the Wisconsin Experiment Station on the investigation. "The relative expense, however, of producing and feeding green crops," continues the report, "is considerably greater than that of producing and feeding silage. This is due to the greater amount of labour expended upon the green crops, and to the unpalatability and the waste of such crops caused by storms or drought and conditions which are difficult to control. Years in which the rainfall is below normal, and the pastures therefore poor, are also the years when green crops are likely to be scant or fail. The carrying-over of the maize crop from one year to the next by means of the silo tends to equalize the quantity of feed available from year to year; hence ensures against losses in milk-production due to a scarcity of feed."

Silage versus Roots.

Root crops cannot be depended upon; silage can. Moreover, roots are costly to grow—indeed, when the cost of their production is carefully calculated it will be found that they are often more

expensive than the preparation of silage, and quite discount the argument often urged against the preserved forage, that it is too costly either to make the stack or to fill the silo. Further, there is the ever-present risk of disease with root crops, which makes this method of stock-feeding a more or less precarious one. Roots must also be fed at a certain time; whereas silage can be kept almost indefinitely, and therefore need only be used at the most convenient period.

CROPS FOR SILAGE.

While silage may be made from practically anything, the quality of the silage, or its feeding-value, depends in direct ratio on the quality of the material from which it is made. Probably no other plant will give the same weight of silage, and this of high-feeding quality, as maize. Maize will also yield a greater quantity of valuable food per acre for milking-stock when silaged in a silo—that is, under good conditions of farm-management — than will any other crop. A really good crop of a suitable variety in a favourable environment may be expected to provide 30 to 40 tons of silage material per acre. For stack silage maize is also a valuable plant. Maize need not necessarily be fully ripe for conversion into silage, though it is advisable that the cobs should be well glazed before use. A common mistake made is to sow maize too thickly. This prevents the plant attaining proper development. Maize demands an abundance of air and sunlight to make its best growth and provide its great yield of feeding-material. Sown in drills 24 in. to 27 in. apart, and seeded at the rate of three-quarters to a whole bushel per acre, this requirement is assured, while the intercultivation thus rendered possible enables the plant to make its naturally vigorous growth. The close planting of maize means a thin weak stalk containing too much moisture, a condition which, while desirable as it is for feeding the maize in a green state, is most undesirable where the material is chaffed for a silo. When immature maize is chaffed for a silo, whether the immaturity be due to thick seeding or premature harvesting, the excess of moisture is a source of annoyance in filling the silo—the high degree of moisture making it difficult to secure the desired temperature—while it fails to provide the right degree of feeding-material. For the silo maize should contain no more water than can be retained in the stalk of the plant. It is advisable to manure well for maize, which naturally makes a certain drain on soil-fertility, while the plant demands rapid stimulation to ensure its best development. A suitable dressing would range, according to the soil, from 3 cwt. to 5 cwt. of superphosphate and bonedust in equal proportions. Intercultiva-

tion is certainly advisable, to keep the soil friable and check weed-development. The best varieties of maize to use are Red Hogan, Clarence Wonder, Flint's Yellow Dent, and Chester County Mammoth.

Sorghum is another very suitable plant for making silage in the silo form. An average crop should give from 20 to 30 tons per acre. For sorghum the land should be prepared as for a mangel crop—worked down to a fine tilth. The seed can be sown through an ordinary seed-drill by using every other coulter. The sowing should be at the rate of from 15 lb. to 20 lb. per acre. The soil should be fertilized at the rate of about 5 cwt. (bonedust and superphosphate in equal parts). When the plant has grown to 4 in. in height draw the tine harrows across the drills once weekly until the crop is too high. As with maize, sorghum is usually planted in this country too thickly, and is thereby not given an opportunity for proper development. The seed should be sown about the first week in December, when the land has become warm, in order that the plants may not receive any serious check.

Millet may also be used for silage, but in my experience it is not to be compared to either maize or sorghum. It should give from 10 to 15 tons of feeding-material to each acre. The cultivation rules advised for sorghum may be followed in the case of millet. The varieties I have found to be the more successful are Japanese, White, French, and Pearl.

Crops which will ensile well and which occupy the ground for a short time only are oats, oats and tares, Italian rye-grass, as well as clovers and grasses. Lucerne makes most valuable silage, and is improved by the addition of some drier material when the early spring and late autumn cuttings are employed.

In preparing the land for crops for silage purposes it is recommended to plough the land in the autumn, so that it may be exposed to atmospheric influences during the cold months of the year. In the spring it should be cross-ploughed deeply and then allowed to rest for a further period. Just before seeding the soil should be worked down to a fine tilth with the disc and harrows until a thoroughly good seed-bed is secured. Depth and thoroughness of cultivation are of great importance: nothing can take their place.

THE FEEDING OF SILAGE.

It is recommended in the opening-up of a silo to commence feeding, especially by those who have not been accustomed to the work, that only a small quantity be given at first—say, from 10 lb. to. 20 lb., according to the size of the animal—twice daily, with a little hay or roughage for the first day or two. The full silage

ration is 40 lb. for a dairy cow, twice daily after milking, or no more than can be cleared up within one hour of feeding. Animals that are hand-fed should have a few handfuls of silage mixed with the morning and evening meals. It will be found a good appetizer, and they thrive well on it. Always remember to give each animal only that amount which it will clean up at each meal. It is recommended to feed dairy cows in the open paddock. A box should be provided for each animal. This should be 24 in. square by 18 in. in depth, and be made out of 9 in. by 1 in. rough boards. Being heavy, it will not be liable to be knocked over and the feed wasted.

Silage will be found advantageous in the feeding of calves when these are from three to four months old. Especially will it be valuable when the milk-supply diminishes, or where none is available through the local dairy company manufacturing some by-product. During a period of drought calves will be found to thrive well if given a small amount of silage in addition to their usual allowance of hay and other foods. Owing to the ease with which silage is digested it will keep them under all conditions in a healthy thriving condition. After the calves are weaned they may be given all the silage they will eat up clean without waste.

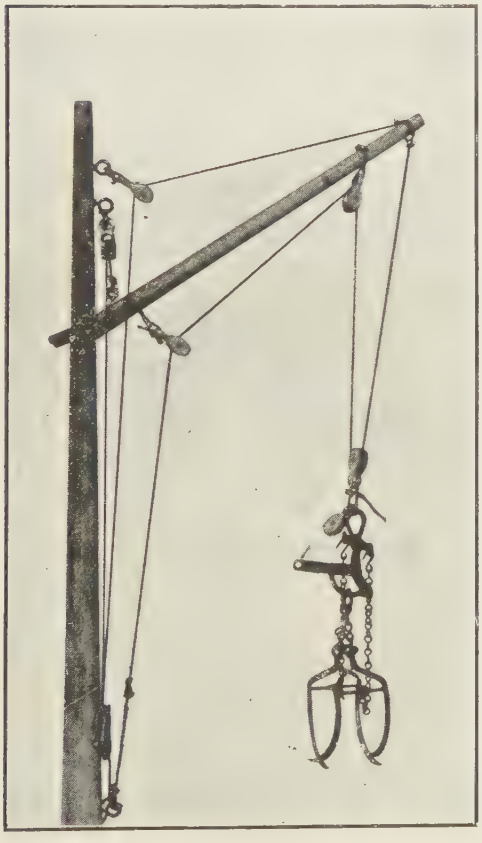
Silage for sheep at certain seasons of the year will yet become highly appreciated in this country. It will be found beneficial in feeding to ewes, also to hoggets during the early autumn and in the winter months. It is best fed with green wheaten chaff. There are times when all stock require a tonic or an additional help in the way of feed. We often hear of hoggets dying in considerable numbers, although perhaps there is an abundance of certain feed available to them. I have experienced this with hoggets which have become affected with parasitic gastritis. When, however, fed from troughs (made out of 9 in. by 1 in. timber) twice daily, with green-wheat chaff mixed with good silage, a little molasses being sprinkled over the mixture, I found the hoggets did remarkably well. I hope to see a similar experiment carried out at an early date, when further information should be available. I have often seen hoggets exposed for sale that were by no means a credit to the breeder. There is no need for stock to have a starved appearance. If they have, there must be something radically wrong with the system of management. Sour silage cannot be recommended for sheep.

Working-horses will do well with a small quantity of silage mixed with their ordinary feed. Further, it will be found valuable for the colts; it will keep these in good thriving condition during the autumn and winter months. Not more than 5 lb. at the one

feeding is recommended. For the feeding of horses silage must be of the best description; it should never be fed to them in a sour or mouldy state. If fed the former quality in any amount over that recommended it will gripe them, and if fed the latter in any quantity it will probably do them more harm than good. Mr. James Patrick, the well-known Clydesdale breeder of the Taieri district, has fed his draught mares on silage with the most satisfactory results, but he had a very good sample of silage for the purpose.

FILLING AN ALL-STEEL SILO.

In filling the large all-steel silo (95-tons capacity) at the Weraroa Experimental Farm my past experience—that the work must not be hurried—was repeated. The proved procedure was this: The first day's carting was allowed to accumulate in the silo without being disturbed in any way: this in order to allow the temperature of the material to reach the desired degree of heat—viz., 125° F. The time occupied to reach a good temperature largely depends on the condition of the material being used. If too succulent the rise is slow, while only when the material is fairly well matured and in just the right condition will the necessary degree of heat be secured without delay—say, in about twenty four hours. It will be found on examination after the first layer has been put in that the centre of the heap will be at a high temperature, probably up to 200° F., but that when it is spread at the edges and evenly tramped all over the temperature throughout will be only 75°. This degree of heat in the bottom layer is not, however, anything like as great as



A SIMPLE DERRICK.

could be desired if sweet silage is to be produced. The temperature should be more in the region of 125°. Having to use the silage material in an immature condition is the reason for the failure to obtain the necessary heat. Maize should be in the glazed-cob stage, with the plant well matured; sorghum should have the tassel well out and the saccharine matter developed in the stalk; oats should be in the milk stage; with tares the pods should be well formed; lucerne should be in the flowering stage; and Italian rye and clovers should be in full bloom. The first layer having reached a satisfactory enough temperature—this can hardly be at too high a degree of heat—the filling was continued with little or no interruption, a temperature of about 100° being registered throughout. About 3 ft. of material was added daily until the big structure was filled.

A SIMPLE DERRICK.

A derrick for hoisting material for a silage stack is here illustrated. It can be constructed by any handy man, the materials being procurable in the majority of country towns. The main pole is 34 ft. in length, the diameter at the base being 8 in. and at the top 4 in. The boom is 18 ft. in length, and is 5 in. in diameter at the base and 2 in. at the top. The long guy-rope, of flexible steel, is 100 ft. in length, and the two shorter ones are each 60 ft. long. The bottom boom-rope (manila) is 60 ft. long and the top one 75 ft. The hoisting-rope (a 3 in. manila) is 135 ft. long.

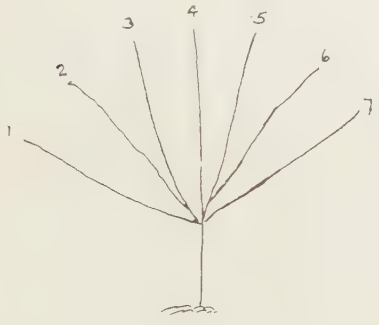
AN ORIGINAL CONCRETE SILO.

ON a farm of the Donald Estate, Featherston, the manager, Mr. Allan Donald, has constructed a concrete silo on somewhat original principles, the object being to reduce the cost of making to a minimum. The silo is a simple concrete tank, of a height of 10 ft., half of this being below the ground surface and half above it. The area of the tank is 21 ft. by 18 ft. The walls are 8 in. thick. A roadway, 4 ft. high at the highest part, was built against the tank, to facilitate filling operations. The silo was filled with oats cut in the milk stage, and these were silaged in the sheaf form. When the filling process had got beyond the first stages 4 in. by 2 in. uprights were employed, to hold the material in position and allow it to settle evenly. No roof is provided, earth being piled on the material to exclude the air.

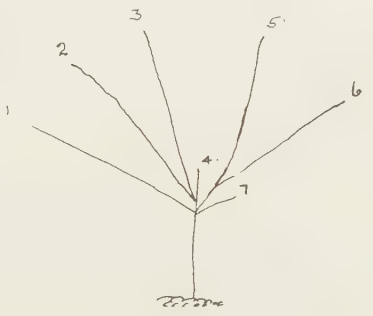
RENOVATION OF PEACHES AND NECTARINES.

S. F. ANDERSON.

AFTER this class of tree attains the age of eight or nine years there is a gradual falling-off in its vigour, the fruit-bearing portion being confined to the extremities. Systematic spraying and pruning no doubt do much to prolong this, but it has proved difficult to maintain payable bearing to a much longer period. This is perhaps more noticeable in a hot dry district like Hawke's Bay than in districts where they obtain more moisture. The conclusion is therefore arrived at that peaches and nectarines exhaust their bearing-wood in a comparatively short time. Fruit produced on young



Before being pruned.



The first pruning, Nos. 4 and 7 cut away. Pruned winter 1910.

wood where there is a greater freedom in the free circulation of the sap is superior to that of old wood. I think this will be admitted to be the case. It is with a view of providing new bearing-wood that peach-tree pruning is practised by our orchardists. It is also the more necessary on account of the efforts of die-back (*Clasterosporium carpophilum*), shot-hole (*Phyllosticta circumcissa*), peach-curl (*Exoascus deformans*), and peach-rust (*Puccinia*), which, if they do not kill, starve and harden the wood.

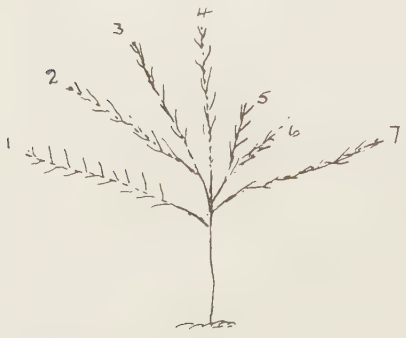
When paying a visit to a grower in Hawke's Bay, who has a well-kept orchard, garden, and small vineyard, he said, "Come and see how I restore my peaches and nectarines into good bearing after they commence to go off." As he had reduced this to a system that has something to recommend it I describe it here. He

had been treating a number of his older trees in the manner given below, and as it has extended over a number of years the results bear out what he claims for it—viz., a renovation of the trees. Take the case of a nectarine, and assume that before starting the treatment it had seven main limbs. The first winter (1910) he cut off two of the limbs, numbered in diagrams as 4 and 7; the stumps of these made a strong growth. The next winter (1911) he

Result of cutting back Nos. 4 and 7 is a strong growth but no fruit. Nos. 1, 2, and 3 are now cut away. Pruned winter 1911.

Nos. 4 and 7 now bearing fruit, and 1, 2, and 3 making growth. Nos. 5 and 6 are now cut back. Pruned winter 1912.

cut off Nos. 1, 2, and 3. The growth made from 4 and 7 then bore fruit the following summer, and the stumps of 1, 2, and 3 made a strong growth. The following winter (1912) he cut back limbs 5 and 6. The following summer Nos. 1, 2, 3, 4, and 7 bore fruit, and 5 and 6 made a strong growth. The summer of 1914 saw all the old limbs replaced with strong young wood, and bearing a crop of fruit. The progress of this renovation is shown in the



Condition of tree summer 1912–1913. Nos. 1, 2, 3, 4, and 7 bearing fruit, and 5 and 6 making growth.

The tree renovated summer of 1914.

six diagrams. The growth made on all the trees treated in the above-mentioned manner was healthy, and bearing fine fruit. The old wood had been taken away without any serious check to the tree, and replaced by strong and vigorous shoots, with fair prospects of continuing profitable for another eight or more years. It must be noted, however, that the usual spraying was not omitted, and the pruning of each limb was carefully followed out. The trees should not be allowed to get too far back in condition before this renovation is taken in hand, so that the old limbs may be kept in bearing while the new growth is being made. The cutting-back will tend to assist in this.

A SPREADER FOR LIME.

The illustration herewith is that of an American implement (manufactured by George Kubacki, DuBois, Illinois) for spreading ground

limestone or rock phosphate. The spreader holds about 100 lb. of material, and, it is claimed, will spread effectively from 1 lb. to 1,000 lb. per acre. The wheels of a mowing-machine are used for the spreader.

CACTACEAE.

COMMONWEALTH PROHIBITION OF IMPORTATION.

A proclamation recently issued by the Commonwealth Government prohibiting the importation into Australia of all prickly or spiny species of cactaceae has been amended by Proclamation in the direction of permitting the importation of the flowering or ornamental varieties of these plants.

GRAPE-CULTURE.

TABLE-GRAPES GROWN IN NEW ZEALAND.

S. F. ANDERSON.

OUTDOOR-GROWN GRAPES.

THE increase in the growth of outdoor-grown grapes for table purposes in this Dominion has not been great. It is somewhat difficult to state the exact area that is devoted to the growth of outdoor table-grapes, because so many of the vineyards where wine is made sell all the grapes they can while prices are remunerative. The present returns show 106 acres in table-grapes only. These are principally Albany Surprise and Isabella varieties. The quantity sold last season was 600,800 lb. The value, at 1d. per pound, amounts to £2,503 6s. 8d. The retail value, at 3d. per pound, would be £7,510. There is ample scope for the establishment on proper lines of small vineyards within reasonable distance of the large towns of the North Island. Vines require what may fairly be termed intense culture, and in the vineyards where this has been adopted it is distinctly remunerative. An acre of vines of European varieties such as Black Hamburg, Muscat, Hambro, Golden Chasselas, Chasselas Rose, Black Tokay, properly trained, sprayed, sulphured, and pruned and highly cultivated will produce 6,000 lb. to 7,000 lb. At 3d. per pound this represents £75 per acre. The vines will be in full bearing in the third year after planting. The extraordinary care and cultivation given to vines on the Continent is rarely practised in our more generous climate. To make a success of the business, however, high culture is essential.

The present supply of outdoor grapes to the Auckland market still comes largely from the Isabella and Albany Surprise varieties, and the greater part of them from patches grown in a semi-wild state undeserving the name of vineyard. It is to be hoped that the efforts made by the Department to give information on all horticultural subjects, and by example on the State farms, will enable growers to see the importance of doing better work. Notwithstanding the great increase in the value of land all over the Dominion, some vine-growers attempt to work more than they can properly control. The price of labour is put forward as an excuse, but no good reason can be given for working a large place badly.

The price of 3d. per pound has been given in the case of grapes of European varieties when well grown and marketed in an attractive form. This price is not obtained by the grower of the other varieties, nor could they expect it where so little care is bestowed.

Table-grapes grown under Glass.

There are now 715 glasshouses in the Dominion for growing grapes, occupying 926,486 square feet, or 21·26 acres. As the borders of these houses require rather more than the actual area of the houses, over 42½ acres are occupied. The value of these buildings at the moderate estimate of £2 per running foot is £85,594.

Estimating the value of the product of these houses at 1 lb. of grapes for every 2 square feet of the houses, the yield will be 463,243 lb. of grapes. A fair average price is 1s. per pound, giving a total value of £23,162 3s.

To sum up the money now invested in the Dominion for the production of table-grapes, also the estimated production, the following statement is given, viz. :—

	£
Land occupied by vines producing outdoor-grown grapes for table use only: 106 acres at £30 per acre	3,180
Land occupied by vinehouses: 42 acres, estimated at £100 per acre ..	4,200
Value of vinehouses: The value vested in vinehouses is arrived at by taking the total length of the houses and estimating them to cost £2 per running foot of house. No house of any stability can be put up under £1 10s. per foot, and the greater number built for commercial purposes cost up to £3 4s. per foot, so that £2 may be considered a fair average price. There are 715 houses, giving a length of 42,797 ft.: this at £2 per foot = ...	85,594
	£92,974
Estimated yield from the above: Annual sale of outdoor-grown grapes: Returns from auctioneers, 36,550 16 lb. boxes; other sales estimated at 1,000 16 lb. boxes: Total number of 16 lb. boxes, 37,500 = 600,800 lb. Valuing this quantity at 1d. per pound = ... This estimate is confirmed as agreeing with what is a fair average yield per acre—viz., 5,668 lb.	2,503
Yield from the vinehouses: This is arrived at by estimating 1 lb. of grapes for every 2 square feet of house (not square feet of glass). 715 houses containing 926,486 square feet yield 463,243 lb. of grapes at 1s. per pound	23,162
	£25,665

The sum set down as the estimated yield from the sale of table-grapes shows a return on the invested capital of £27 12s. per cent.

Seeing that a return can be obtained from the whole industry as good as the above where a considerable proportion of the work is indifferently done, it bears out my statement in the foregoing

portion of this and other reports that grape-growing is a profitable branch of the fruitgrowing industry. It may also be remarked that much of the work, such as tying, summer pruning, gathering and packing the fruit is not at all laborious, and is within the power of many a family circle.

It is proposed to set forth in bulletin form the best methods of growing the European grapes on espaliers, embracing methods and culture already given from month to month in the *Journal*. When this has been done I shall have completed in a handy and, I trust, helpful form directions for the management of the vine outdoor and under glass.

VINE-STOCKS.

OF the three stocks on which the main cropping-vines at the Waerenga Experimental Farm are worked, two members of the Rupestris family — the Riparia and the Mourvedre — are showing

C. E. Cuming, photo.]
CABERNET SAUVIGNON, THE MOST-VALUED WINE-GRAPE, GROWING ON RIPARIA RUPESTRIS STOCK AT WAERENGA EXPERIMENTAL FARM.

up to better advantage. The Du Lot, which is favoured in Victoria, has apparently but a brief life on clayey gum land such as that which is characteristic of the Waerenga Farm, and this is becoming more marked every year. The Rupestris stocks mentioned above, on the other hand, are holding out splendidly.

PERENNIAL RYE-GRASS SEED.

A. H. Cockayne.

Perennial rye-grass (*Lolium perenne*) is by far the most extensively used grass for pasture formation in New Zealand. In fact, the very widespread employment of rye-grass is one of the outstanding features of agriculture in the Dominion. Until quite recent years this grass formed the dominant constituent in *all* pasture mixtures irrespective of the soil or climatic conditions where they were sown. This general adoption of rye-grass was due very largely to the fact that the seed* was always cheaper than any other, and in consequence apparently heavy sowings could be secured at quite a low expenditure. It is now, however, recognized that perennial rye-grass should be sown only under certain conditions, and that in many districts of New Zealand its duration is short, and therefore it should not form an important ingredient in mixtures for certain permanent pastures. This has tended to restrict the employment of rye-grass seed over many areas of New Zealand, but nevertheless it still holds the premier position so far as annual consumption is concerned. Considerably more than one million bushels of seed are sown each year. This amount greatly exceeds that of any other pasture plant, and vies in quantity with that of oats, New Zealand's leading cereal crop.

Although a very large amount of rye-grass seed is consumed in the laying-down of permanent pasture, the major quantity is employed for the formation of pastures of short duration, so common a feature in those regions where some system of alternate cropping is adopted. The common procedure of following cereals and other crops with grass and allowing the land to remain in pasture for a varying number of years before being again ploughed and utilized for annual crops creates a large yearly demand for rye-grass seed. This demand, too, is one that will continue for many years, so that the growing of perennial rye-grass seed is likely to remain a permanent industry in those localities where its production can be profitably carried out.

*In this article the word "seed" is used throughout in its popular sense. Rye-grass "seeds" are really fruits, known as "caryopses," enclosed in glumes, commonly termed husks or chaff.

Sources of Seed.

Perennial rye-grass seed is rarely imported, but occasionally when the local price is high and supplies are short a comparatively small amount may be introduced, mainly from the North of Ireland. Such seed is generally of excellent quality, but does not find favour with the majority of farmers, who have a prejudice against the imported article, and unless it can be quoted at a low rate will not entertain its purchase. In general, however, the local crop is sufficient to fulfil all requirements, and at times overproduction occurs. Very little rye-grass is exported, owing to prices in New Zealand being generally considerably higher than those in Europe; so that overproduction results in the prices falling, with a consequent contraction in the area devoted to seed-raising, until such time as the oversupply has been worked off. Thus seed that is several years' old may be on the market, and as it may not have been harvested or stored under the best of conditions its germination may be very feeble. Great care has, therefore, to be exercised in buying seed for some seasons after an overproduction has occurred.

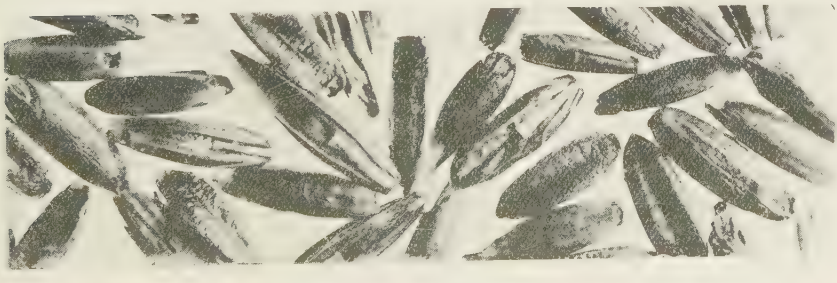
There are two main classes of rye-grass seed in New Zealand: that harvested from young and that from permanent pasture. In the North Island the majority of the seed is produced on pastures of the latter type, while the bulk of southern seed is of young-pasture origin. It is customary to term seed harvested from pastures that have been sown less than two years "maiden" seed, all other being termed "old-pasture" rye. There is a widespread belief that an old pasture produces seed of a more perennial nature than does a young pasture, and this has led to a great demand for seed harvested from areas that have been laid down in rye-grass for many years. Such seed always commands a much higher price than does that from newly laid down pastures. In the majority of cases rye-grass seed from young pastures is much longer than that from old pastures, and the term "lanky seed" is applied to the former, while the shorter type is generally termed "shotty seed."

The area devoted to rye-grass-seed production averages about 60,000 acres, and has not varied much during the past four years. It reached its maximum in 1912, when over 77,000 acres were harvested, whilst last season under 60,000 acres were cut for seed, The 1902 crop was the smallest during the past twenty years, less than 17,000 acres being reserved for this crop. The figures supplied in the Agricultural Statistics are really not satisfactory, as Italian rye is sometimes grouped with perennial rye-grass and

Typical Short-seeded Old pasture Rye-grass.

Typical Long-seeded Maiden Rye-grass.

Redressed Seconds, consisting of Terminal Seeds.



Over-machined Rye-grass.

sometimes not, but the figures given here are approximately correct. During the past season about 11,000 acres of rye-grass were harvested in the North Island, and some forty-odd thousand in the South Island. The North Island crop is mainly produced in the Auckland, Sandon, and Hawke's Bay districts. In each of these centres about 4,000 acres are annually harvested. Southland is the most important rye-grass seed district in the South Island, and about 20,000 acres are annually harvested in that province, while Canterbury and Otago each contribute over 10,000 acres of seed towards the rye-grass crop.

The average yield is about 500 lb. per acre of undressed seed, but in seasons when bad weather is experienced the average may not exceed 400 lb., while in exceptionally favourable years the yield may be as high as 650 lb. In individual cases over 1,200 lb. per acre may be harvested, but these are really exceptional, and are mainly restricted to crops from young pasture.

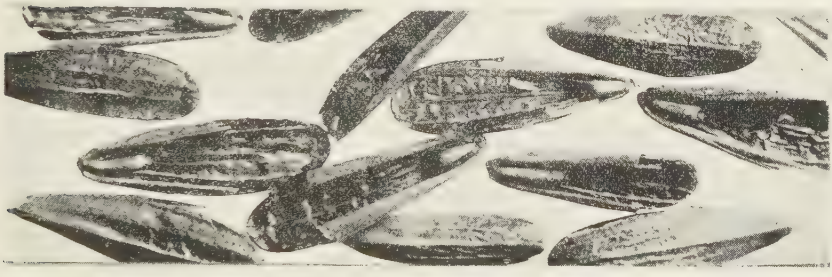
Rye-grass varies very much in quality, and in the buying of seed special attention should always be given to the following: (1) Bushel-weight; (2) purity; (3) germination.

Bushel-weight.

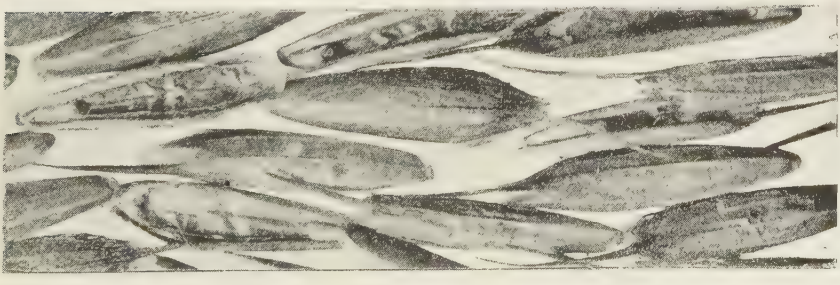
Great stress is always laid on the bushel-weight of rye-grass seed, especially in machine-dressed lines. It is customary to suppose, provided the purity of a line is satisfactory, a high bushel-weight will be a sure guarantee that the seed will be of a high germinating-capacity. This, however, is not always the case, as many lines of comparatively high bushel-weight tested during the past four years have given poor germination results. A good-weight rye-grass, of course, contains only a small percentage of empty and immature seeds, and it is almost entirely by the removal of chaffy seeds that the bushel-weight of rye-grass is increased in the dressing operations. In many cases the cleaning necessary to remove the majority of the extraneous seeds is accomplished long before the bushel-weight that is being aimed at has been reached, and all subsequent cleaning has for its object the removal of light and chaffy rye-grass seeds. When a line, however, contains a large percentage of fully matured seeds devoid of vitality no dressing of any description can make the germination satisfactory. This was well exemplified in the 1912 crop, where many lines were dressed to as high as 30 lb. per bushel, and still the germination remained bad. When one line is dressed up to two separate weights—say, 27 lb. and 30 lb.—the heavier sample will almost invariably give a higher germination than the lighter one, owing

Shelled Rye-grass.

Ergot Sclerotia.



Goose-grass (Bromus hordeaceus), partly shelled.

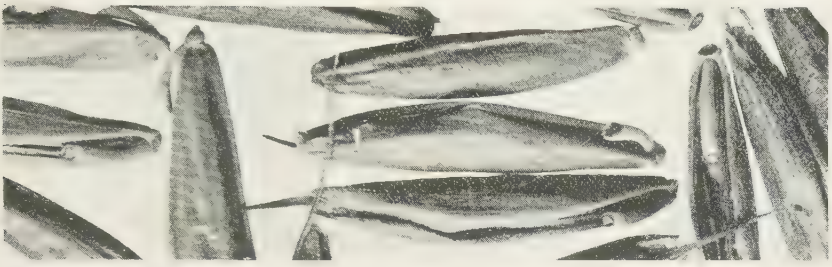


Goose-grass (Bromus hordeaceus).

to the more complete removal of the empty and semi-empty husks. This is true, of course, only when the germination tests are carried out with seed irrespective of whether it is fully matured or not. This system of testing is the one adopted by the Department, but in many European stations the tests are conducted only with matured seed, the light and empty husks being included in the analysis as impurities. Under the European system a 27 lb. and a 30 lb. sample from the same line would yield a similar germination, but the purity of the lighter sample would be lower than the higher-weight seed. In our tests, however, the heavier sample would not differ appreciably in purity from the lighter one, but the germination would be considerably higher.

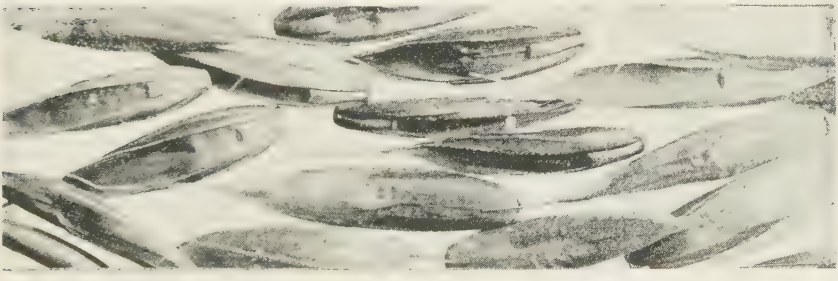
Undressed rye-grass varies in weight from about 16 lb. to 25 lb., while occasionally it may be higher, but in such cases it generally contains a large proportion of clover-seed. Machine-dressed seed varies in weight from 27 lb. to 35 lb. At times, again, especially when harvest conditions have been bad, it is difficult to reach a weight of over 26 lb. without an excessive loss of seed occurring, while in exceptional cases a weight of over 40 lb. per bushel has been secured. Each additional pound in the bushel-weight increases the value, so that a 32 lb. seed is nearly always dearer per pound than a 30 lb. seed. It is this grading of quality almost entirely on the bushel-weight that I hold is wrong, as it presupposes that a heavy-weight seed will always be of better germination than a lighter one.

The difference in weight that exists between various lines of rye-grass is due largely to a variation in the size of the individual seeds. In general, the smaller the seed the higher will be the bushel-weight; but this is not always the case, as the individual weights of seeds of similar size vary considerably. In the Departmental seed-testing the actual weight of the seeds is always determined. In rye-grass the weight per 1,000 seeds in machine-dressed seed has been found to vary from 1·2 grams to 2·3 grams, so that the number of seeds per pound varies between 195,000 and 375,000. It was thought at one time that the lines containing seed of heavy individual weight would germinate better than lighter seed, but this has not been demonstrated; and the only thing that can be said is that heavy seed is often of high germination capacity. It is interesting to note that short, shotty seed on the average weighs individually as high as does the long, lanky seed, showing that the grain itself in the short seed is generally more developed than in the long seed. In certain lines of high-bushel-weight short seed a large number of seeds may be seen that are more rounded and more pointed than are normal

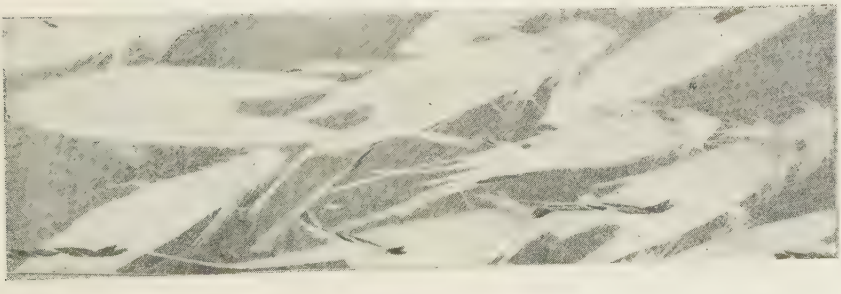


CHEAT (BROMUS SECALINUS).

SWEET VERNAL (ANTHOXANTHUM ODORATUM), SHELLED AND UNSHELLED.



ITALIAN RYE-GRASS (LOLIUM ITALICUM).



LARGE-SEEDED DANTHONIA (DANTHONIA PILOSA).

seeds. These are those that are developed at the extremities of the spikelets and are called "terminal" seeds. They often accumulate in the seconds, and this material, being then dressed separately, produces a sample consisting of quite short, plump, and very characteristically shaped seed that generally germinates very freely.

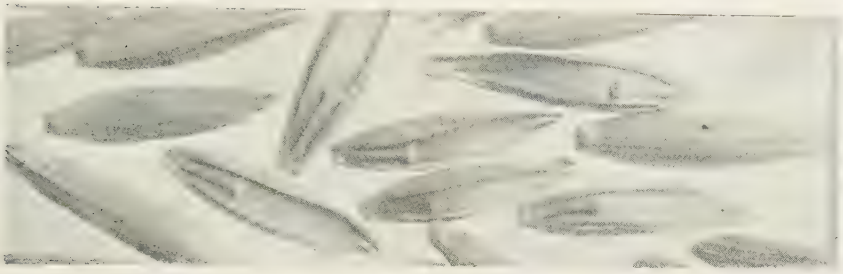
OVERDRESSING.

Samples are frequently found in which the outer coverings, or glumes, of the grain are torn and chipped. Many of them may be completely removed, leaving the grain bare. This condition is generally looked upon as a serious defect, and the aim of the expert seed-cleaner is to secure as high a bushel-weight as possible with as little shelling as possible, and with a minimum of apparent injury to the contour of the seed. Samples that have the glumes chipped and which contain many bare grains are said to be overdressed, and this process is thought to have a serious effect on germination. For my part, I am inclined to think the harmfulness of overdressing rye-grass has been largely overestimated. Many lines of seed, apparently overdressed, have been germinated with excellent results, and shelled rye-grass almost invariably gives a high test. Unless the grains themselves are broken or the delicate embryo situated at the basal end of the grain damaged, no injury can possibly result from overdressing. The presence of large numbers of broken seeds in a line would be a serious drawback, but so far as my experience goes I have never found a large percentage of such seeds in overdressed lines. If a line that has been palpably overmachined yields as good a germination as a line with the glumes uninjured, both lines must be looked upon as of equal value so far as vitality is concerned, and were the overdressed line of superior purity it would be a better one for sowing than the other. Nevertheless the general opinion is that overmachining seriously injures the seed, a supposition that has not been borne out in practice in the laboratory.

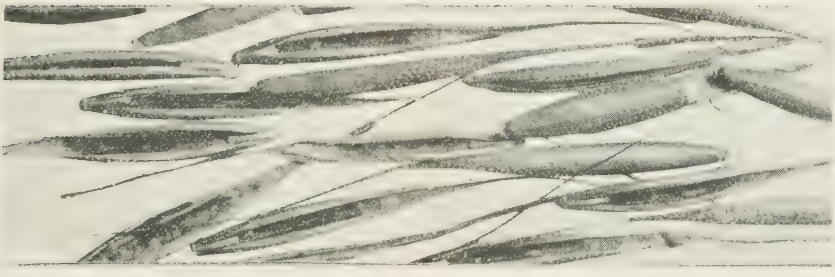
PURITY.

The purity of farmers' samples of rye-grass is often very low, and a loss in weight of from 15 to over 50 per cent. occurs in the process of cleaning. In the main, undressed old-pasture rye-grass is more impure than is undressed maiden seed, and the loss in cleaning is therefore greater. This is not to be wondered at, as a field of rye-grass that has only been sown a short time is nearly always a purer association than is an old pasture. Many farmers often buy direct from the grower, and do not have the

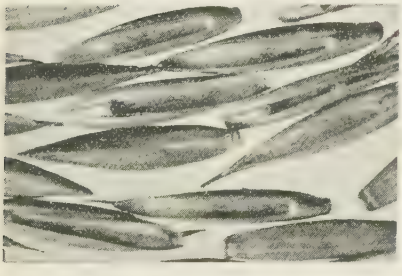
Barley-grass (Hordeum murinum).



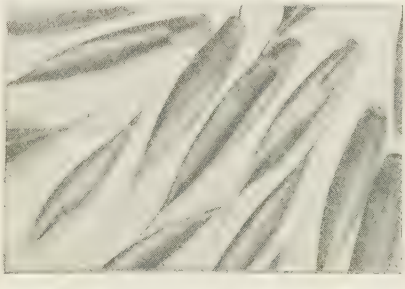
Floating Sweet-grass (Glyceria fluitans).



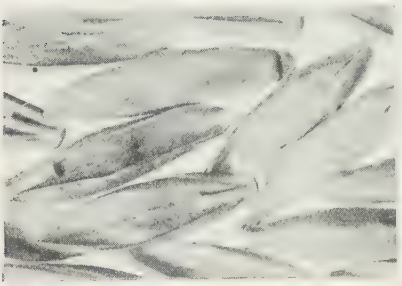
Hair-grass (Festuca bromoides).



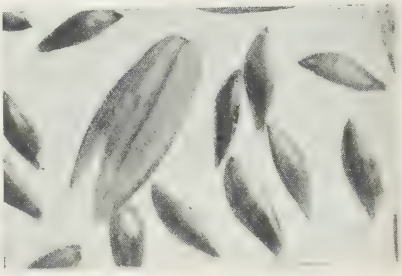
Chewing's Fescue (Festuca saburicola).



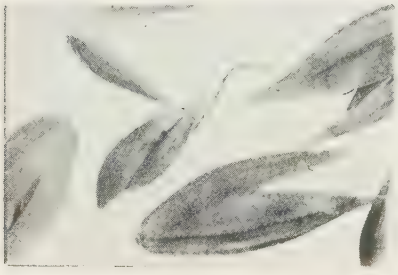
Sheep's Fescue (Festuca ovina).



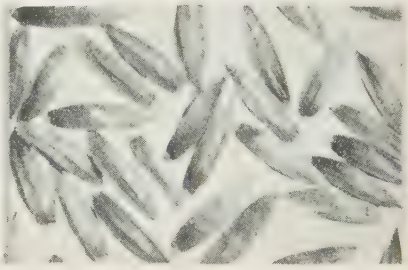
MEADOW-FESCUE (FESTUCA PRATENSIS).



YORKSHIRE FOG (HOLCUS LANATUS).

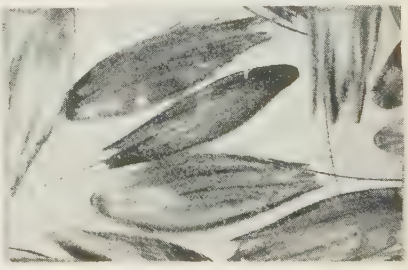


CREEPING FOG (HOLCUS MOLLIS).

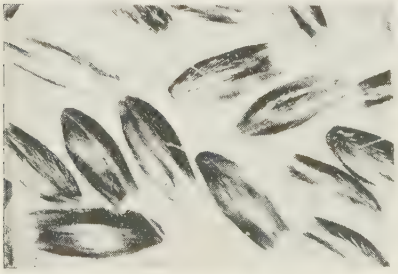


ROUGH-STALKED MEADOW-GRASS (POA TRIVIALIS).

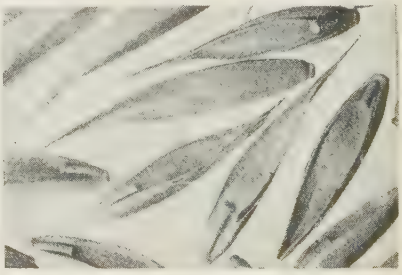
SMOOTH-STALKED MEADOW-GRASS (POA PRATENSIS).



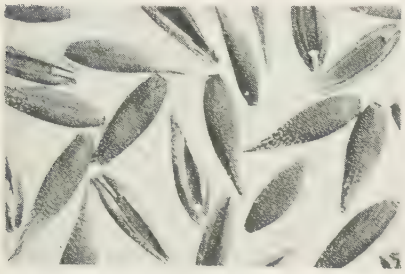
MEADOW-FOXTAIL (ALOPECURUS PRATENSIS).



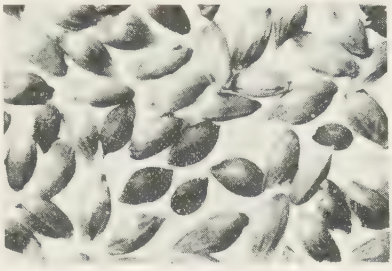
KNEE-JOINTED FOXTAIL (ALOPECURUS GENICULATUS).



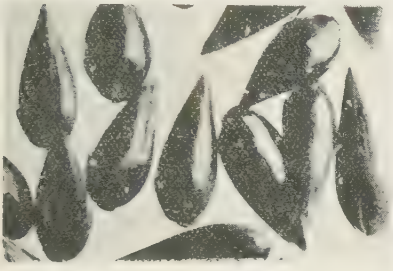
COCKSFOOT (DACTYLIS GLOMERATA).



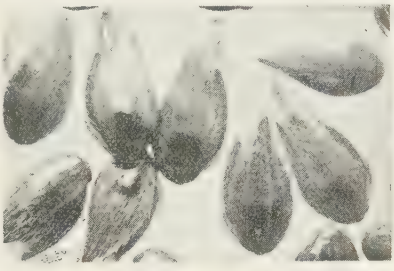
CRESTED DOGSTAIL (CYNOSURUS CRISTATUS).



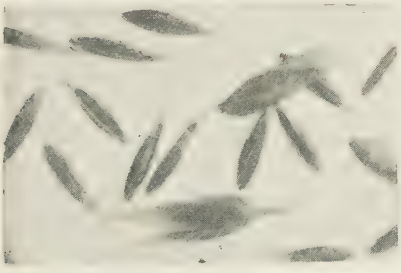
TIMOTHY (PHLEUM PRATENSE).



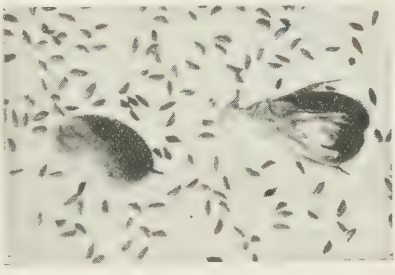
CANARY-GRASS (PHALARIS BULBOSA).



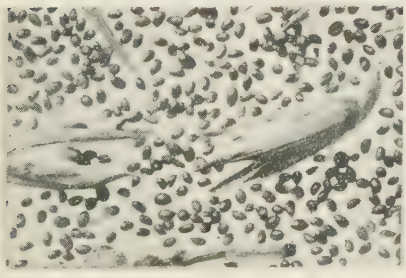
SMALL CANARY-GRASS (PHALARIS MINOR).



EUROPEAN HAIR-GRASS (AIRA PRAECOX).



NATIVE RUSH (JUNCUS EFFUSUS).



TOAD-RUSH (JUNCUS BUFONIUS).

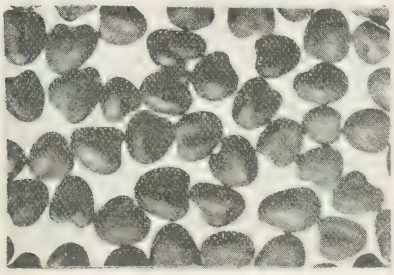
SEDGES (CAREX SP.).

seed machine-dressed. Their contention is that they know exactly what was growing in the field from which the crop was harvested, and as it did not contain any weeds that were not already present in the land on which the seed was to be sown no advantage would be secured in having the seed dressed. While fully agreeing with the contention that a knowledge of the exact origin of rye-grass seed is of importance, I maintain that only machine-dressed seed should ever be used for sowing. When one farmer buys from another he should have the seed dressed, and as this does not cost more than 3d. per bushel, and the seed is railed free one way, the cost is not great. It is certainly more than recovered by using a purer seed in the laying-down of pasture.

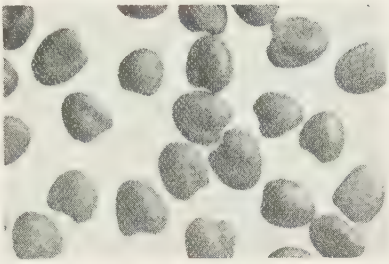
The purity of machine-dressed rye-grass is nearly always high, and the aim of the seed-cleaner is to dress the seed to over what he terms a 99-per-cent. standard. This means that in the cleaned seed there should not be more than one extraneous seed per 100 rye-grass seeds. This standard is nearly always reached in seed weighing over 30 lb. per bushel, but at times, through the shelling of the goose-grass and the breaking of the awns of the hair-grass, a 99-per-cent. standard of purity cannot be secured.

An examination of 400 samples of machine-dressed rye-grass harvested in various parts of New Zealand showed that the extraneous seeds contained in them comprised sixty-three different species. The following is a list of these extraneous plants, together with the number and percentage of the samples in which they occurred :—

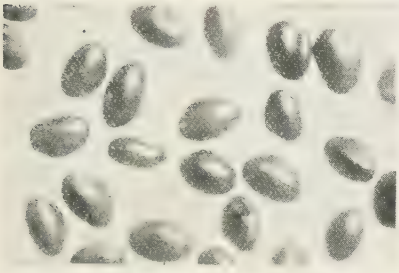
1. Goose-grass (*Bromus hordeaceus*) occurred in 322 (80·50 per cent.) samples.
2. Hair-grass (*Festuca bromoides*) occurred in 254 (63·50 per cent.) samples.
3. Catsear (*Hypochaeris radicata*) occurred in 193 (48·25 per cent.) samples.
4. Italian rye-grass (*Lolium italicum*) occurred in 189 (47·25 per cent.) samples.
5. Sorrel (*Rumex acetosella*) occurred in 185 (46·25 per cent.) samples.
6. Suckling-clover (*Trifolium minus*) occurred in 141 (42·75 per cent.) samples.
7. Cocksfoot (*Dactylis glomerata*) occurred in 106 (26·50 per cent.) samples.
8. Sweet vernal (*Anthoxanthum odoratum*) occurred in 89 (22·25 per cent.) samples.
9. Yorkshire fog (*Holcus lanatus*) occurred in 76 (19·0 per cent.) samples.
10. White clover (*Trifolium repens*) occurred in 60 (15·0 per cent.) samples.
11. Rib-grass (*Plantago lanceolata*) occurred in 54 (13·50 per cent.) samples.
12. Curled dock (*Rumex crispus*) occurred in 43 (10·75 per cent.) samples.
13. Crested dogstail (*Cynosurus cristatus*) occurred in 42 (10·50 per cent.) samples.
14. Alsike (*Trifolium hybridum*) occurred in 34 (8·50 per cent.) samples.
15. Hawkbit (*Leontodon hirtus*) occurred in 21 (5·25 per cent.) samples.



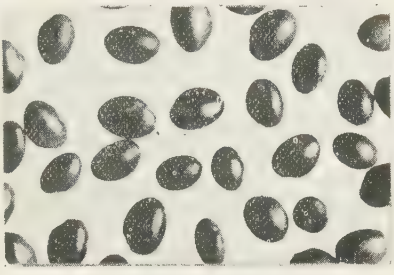
Alsike (Trifolium hybridum).



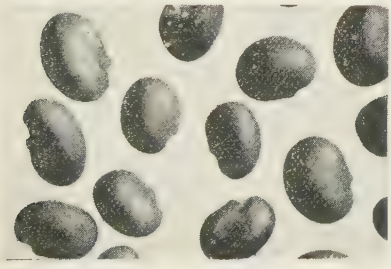
White Clover (Trifolium repens).



Hop trefoil (Trifolium procumbens).



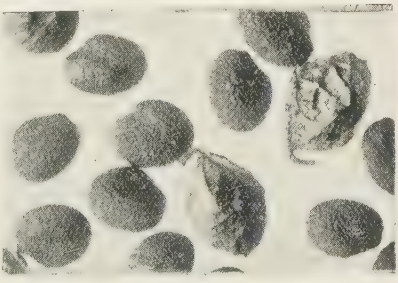
Suckling-clover (Trifolium minus).



Trefoil (Medicago lupulina).

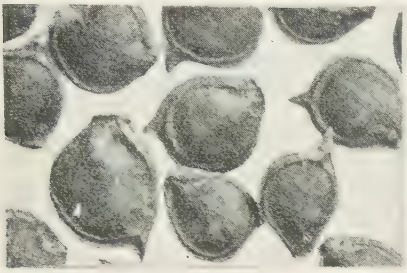
Trefoil (Medicago lupulina), unhusked.

Red Clover (Trifolium pratense).

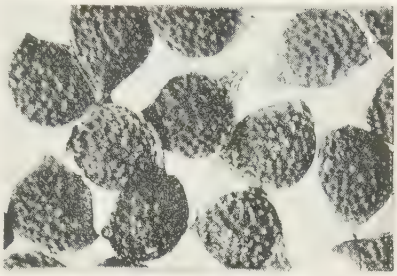


Wild Melilot (Melilotus arvensis).

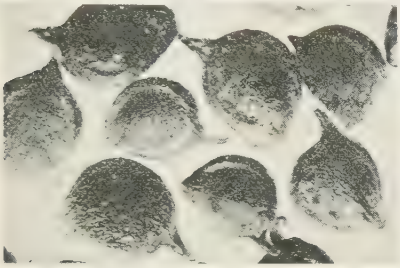
16. Broad dock (*Rumex obtusifolius*) occurred in 20 (5·0 per cent.) samples.
17. Wild turnip (*Brassica campestris*) occurred in 17 (4.25 per cent.) samples.
18. Australian flax (*Linum marginale*) occurred in 17 (4·25 per cent.) samples.
19. Small-flowered buttercup (*Ranunculus parviflorus*) occurred in 17 (4·25 per cent.) samples.
20. Toad-rush (*Juncus bufonius*) occurred in 16 (4·0 per cent.) samples.
21. Red clover (*Trifolium pratense*) occurred in 13 (3·25 per cent.) samples.
22. Spear-thistle (*Carduus lanceolatus*) occurred in 10 (2·50 per cent.) samples.
23. Cut-leaved cranesbill (*Geranium dissectum*) occurred in 9 (2·25 per cent.) samples.
24. Smooth-stalked meadow-grass (*Poa pratensis*) occurred in 9 (2·25 per cent.) samples.
25. Spurrey (*Spergula arvensis*) occurred in 5 (1·25 per cent.) samples.
26. Smartweed (*Polygonum Persicaria*) occurred in 5 (1·25 per cent.) samples.
27. Trefoil (*Medicago lupulina*) occurred in 5 (1·25 per cent.) samples.
28. Hairy buttercup (*Ranunculus sardous*) occurred in 5 (1·25 per cent. samples.
29. Red fescue (*Festuca rubra*) occurred in 5 (1·25 per cent.) samples.
30. Knee-jointed foxtail (*Alopecurus geniculatus*) occurred in 4 (1·0 per cent.) samples.
31. Rough-leaved sowthistle (*Sonchus asper*) occurred in 4 (1·0 per cent.) samples.
32. Timothy (*Phleum pratense*) occurred in 4 (1·0 per cent.) samples.
33. Carex sp. occurred in 4 (1·0 per cent.) samples.
34. Catchfly (*Silene gallica*) occurred in 4 (1·0 per cent.) samples.
35. Hawkweed (*Crepis capillaris*) occurred in 3 (0·75 per cent.) samples.
36. Sheep's fescue (*Festuca ovina*) occurred in 3 (0·75 per cent.) samples.
37. Wireweed (*Polygonum aviculare*) occurred in 3 (0·75 per cent.) samples.
38. Field-madder (*Sherardia arvensis*) occurred in 3 (0·75 per cent.) samples.
39. Oat (*Avena sativa*) occurred in 3 (0·75 per cent.) samples.
40. Barley-grass (*Hordeum murinum*) occurred in 2 (0·50 per cent.) samples.
41. Soft cranesbill (*Geranium molle*) occurred in 2 (0·50 per cent.) samples.
42. Soft fog (*Holcus mollis*) occurred in 2 (0·50 per cent.) samples.
43. Ox-eye daisy (*Chrysanthemum Leucanthemum*) occurred in 2 (0·50 per cent.) samples.
44. Native rush (*Juncus effusus*) occurred in 2 (0·50 per cent.) samples.
45. Small canary-grass (*Phalaris minor*) occurred in 2 (0·50 per cent.) samples.
46. Meadow-foxtail (*Alopecurus pratensis*) occurred in 2 (0·50 per cent.) samples.
47. Floating sweet-grass (*Glyceria fluitans*) occurred in 2 (0·50 per cent) samples.
48. Large-seeded danthonia (*Danthonia pilosa*) occurred in 2 (0·50 per cent.) samples.
49. Hawkbit (*Leontodon autumnalis*) occurred in 2 (0·50 per cent.) samples.
50. Scarlet pimpernel (*Anagallis arvensis*) occurred in 2 (0·50 per cent.) samples.
51. Creeping buttercup (*Ranunculus repens*) occurred in 2 (0·50 per cent.) samples.
52. English hair-grass (*Aira praecox*) occurred in 2 (0·50 per cent.) samples.
53. Canary-grass (*Phalaris bulbosa*) occurred in 1 (0·25 per cent.) sample.



Hairy Buttercup (Ranunculus sardous).

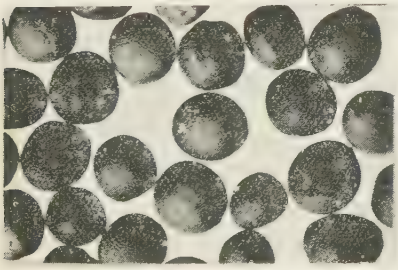


Small-flowered Buttercup (Ranunculus parviflorus).



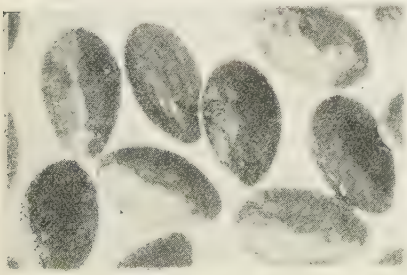
Creeping Buttercup (Ranunculus repens).

Swede (Brassica Napus).



Wild-turnip (Brassica campestris).

Catchfly (Silene gallica).



Australian Flax (Linum marginale).

Cut-leaved Cranesbill (Geranium dissectum).

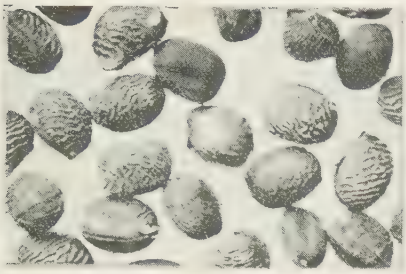
54. Cheat (*Bromus secalinus*) occurred in 1 (0·25 per cent.) sample.
55. Celery (*Apium graveolens*) occurred in 1 (0·25 per cent.) sample.
56. Vetch (*Vicia angustifolia*) occurred in 1 (0·25 per cent.) sample.
57. Swede (*Brassica Napus*) occurred in 1 (0·25 per cent.) sample.
58. Forget-me-not (*Myosotis arvensis*) occurred in 1 (0·25 per cent.) sample.
59. Meadow-fescue (*Festuca pratensis*) occurred in 1 (0·25 per cent.) sample.
60. Wild melilot (*Melilotus arvensis*) occurred in 1 (0·25 per cent.) sample.
61. Cut-leaved plantain (*Plantago Coronopus*) occurred in 1 (0·25 per cent.) sample.
62. Native deyeuxia (*Deyeuxia quadriseta*) occurred in 1 (0·25 per cent.) sample.
63. Hop-trefoil (*Trifolium procumbens*) occurred in 1 (0·25 per cent.) sample.

The presence of certain foreign seeds in rye-grass is often an indication of the origin of the seed as well as that of the age of the pasture from which the seed was harvested. Thus sweet vernal, Australian flax, small-flowered buttercup, cranesbill, catch-fly, cut-leaved plantain, and hop-trefoil are more or less indicative of North Island seed. Oats, wild turnip, Italian rye, swede, spear-thistle, and spurrey are likewise more or less indicative of young pasture, although Italian rye and spear-thistle may sometimes be found in seed from pasture that has been established many years.

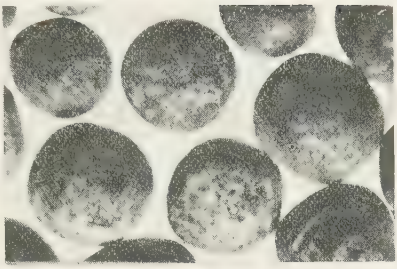
It will be noted that, although rye-grass seed is a migrating medium for a very large number of plants, only about half a dozen species are regularly found in machine-dressed seed. Another very significant fact with regard to machined rye-grass is that the number of really noxious seeds that are likely to be found is very small. For instance, during the whole of my experience I have never noted Californian thistle as an impurity, yet it is not unusual for northern farmers to refuse Southland-grown rye-grass on account of the danger of introducing this thistle on their land.

The Presence of Ergot.

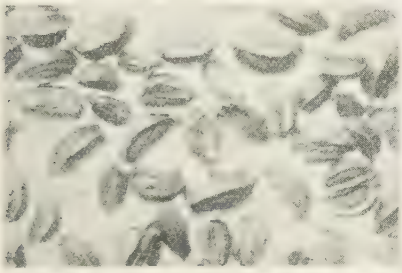
Rye-grass seed, even when thoroughly machine-dressed, frequently contains considerable amounts of ergot (*Claviceps purpurea*). This impurity is fairly characteristic of Sandon seed in most seasons, but when wet weather is experienced during the blooming-period of the rye-grass, seed from all parts of New Zealand is frequently affected. The ergot-spikes appear to be difficult to remove, although they are individually heavier than are rye-grass seeds, and when present in appreciable quantities tend to give a false impression of the real weight of the seed. The presence of ergot is generally looked upon as harmful, and certain countries prohibit the importation of seed containing the resting bodies of this fungus.



Soft Cranesbill (Geranium molle).



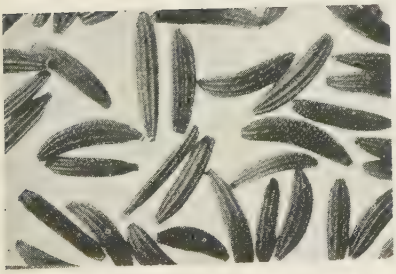
Vetch (Vicia angustifolia).



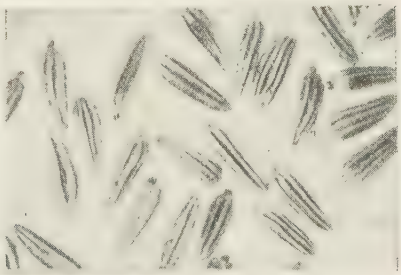
Celery (Apium graveolens).

Catsear (Hypochaeris radicata).

Hawkbit (Leontodon hirtus).



Hawkweed (Crepis capillaris).



Ox-eye Daisy (Chrysanthemum Leucanthemum).

In New Zealand ergot is often prevalent in rye-grass pastures, and apparently no evil effects are sustained by stock grazing thereon. Still, apart from any considerations of the danger of ergotism, it is well to avoid lines that contain an excess of ergot-spurs. Experience has shown that such seed often germinates badly, as a good many apparently sound seeds may, when the glumes are removed, show the presence of the fungus.

GERMINATION.

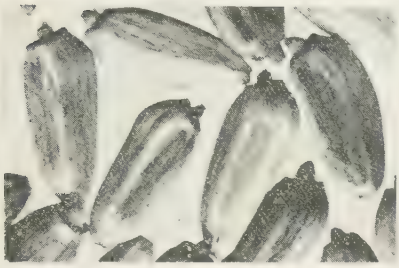
The most important consideration in the purchase of rye-grass seed is the determination of its germination capacity. This is often neglected, as it is currently supposed that rye-grass seed, provided it is not too old, is always of high germination. As this is by no means the case, the testing of the seed becomes indispensable. The following table gives the germination results of 416 samples of perennial rye-grass seed that have been tested during the past two seasons, and gives a good idea of the great range of variation that occurs. These are arranged in groups according to the ascending order of their germination capacities.

Germination Capacity.		Number of Samples.	
	Per Cent.	Number.	Per Cent.
From	0 to 9	3 equals	0·7
,,	10 ,, 19	4 ,,	0·9
,,	20 ,, 29	11 ,,	2·6
,,	30 ,, 39	16 ,,	3·8
,,	40 ,, 49	34 ,,	8·2
,,	50 ,, 59	43 ,,	10·3
,,	60 ,, 69	53 ,,	12·8
,,	70 ,, 79	76 ,,	18·3
,,	80 ,, 89	104 ,,	25·0
,,	90 ,, 100	72 ,,	17·4
Total number of samples		416 ,,	100·0

Average germination capacity of the 416 samples, 70 per cent.

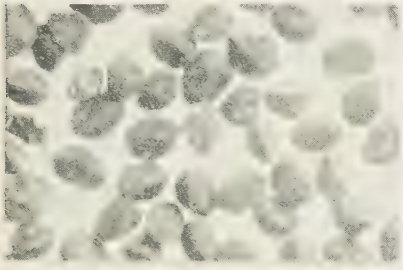
It will be noted that just 60 per cent. of the samples germinated over 70 per cent., and as this percentage should really be the minimum germination allowed for seed of good average quality, it shows that nearly half of the samples recently tested fall below that standard. It must be remembered, however, that a considerable number of these samples are probably of the 1912 harvest, and that the crop was a notoriously bad one so far as germination was concerned.

It is currently supposed that rye-grass after being stored for some years becomes comparatively worthless, but a great deal depends on the conditions under which it is stored as well as the vigour of germination on the maturing of the seed. In 1908

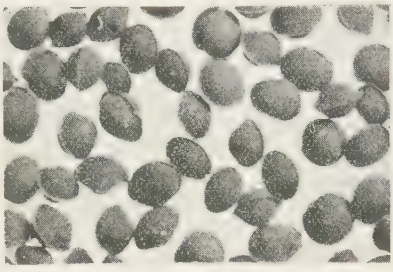


Spear-thistle (Carduus lanceolatus).

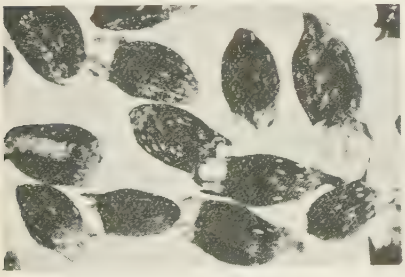
Prickly Sowthistle (Sonchus asper).



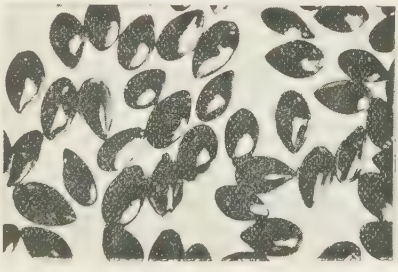
Scarlet Pimpernel (Anagallis arvensis).



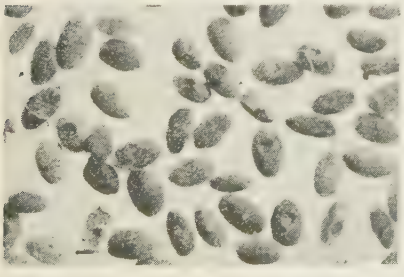
Spurrey (Spergula arvensis).



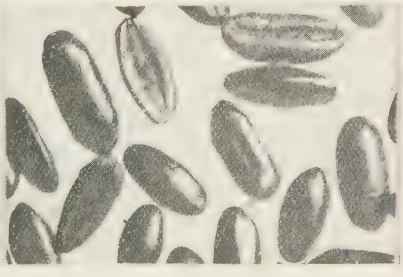
Field-madder (Sherardia arvensis).



Wild Forget-me-not (Myosotis arvensis).



Cut-leaved Plantain (Plantago Coronopus).



Rib-grass (Plantago lanceolata).

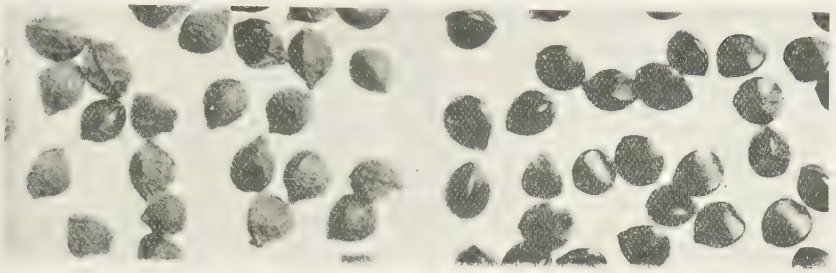
some samples of Hawke's Bay rye-grass seed were taken from the exhibits at the autumn show of the Hawke's Bay Agricultural and Pastoral Association, and these have been germinated from year to year until the present time. The following table shows the alteration in germination that has occurred. It is significant to note that only those two samples that gave a comparatively low test in 1909 have fallen below 70 per cent.

Sample-mark.	Germination Capacity.			
	1909.	1911.	1912.	1913.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
635	99	95	92	78
637	100	100	99	86
638	99	96	96	80
639	69	33	18	3
640	99	97	97	89
642	98	100	97	90
643	97	98	95	75
644	96	94	97	84
645	88	78	55	36
Nelson Bros.	97	91	92	88
H. Russell	97	95	92	83
Sir W. Russell	98	98	98	85
R. B. Wellwood	99	97	95	94
John Higgins	97	99	90	90
J. H. McNiven	98	98	91	80
641	98	95	94	92
H. Pulford	98	100	96	88

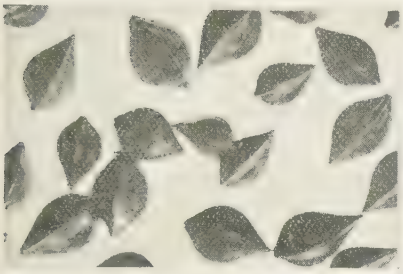
Adulteration of Seed.

Rye-grass seed is rarely if ever adulterated in New Zealand with foreign seed. Apart from the fact that rye-grass seed is of very characteristic appearance, and can only be ordinarily confused with meadow-fescue, its price, even in times of scarcity, is less than any other grass-seed that could be used as a substitute. However, there is a practice that does frequently occur that can really come under the heading of adulteration, and that is the mixing of low-germinating and high-germinating seed together. Theoretically it should not be difficult to detect samples that have been dealt with in this manner, but practically it is almost impossible to do so. For my part, I should advise farmers to in all cases demand a germination guarantee of over 80 per cent. If this were done very little mixing of inferior seed with better-class lines would take place.

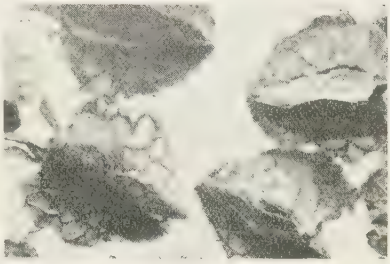
The seeds illustrating this article are six times the natural size. The original photographs are the work of Mr. E. B. Levy, of the Biologist's staff.



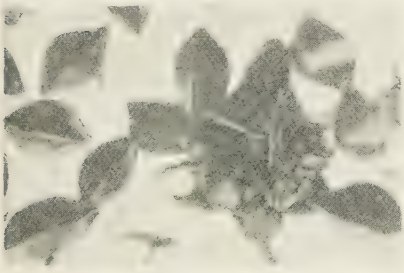
SORREL (RUMEX ACETOSELLA), SHELLED AND UNSHELLED.



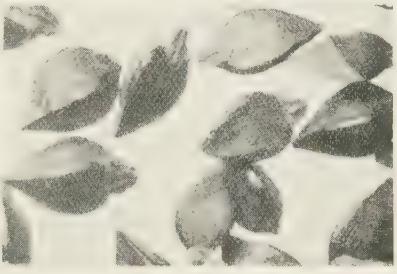
NARROW-LEAVED DOCK (RUMEX CRISPUS), SHELLED.



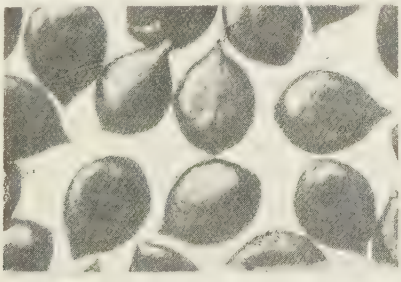
NARROW-LEAVED DOCK (RUMEX CRISPUS), UNSHELLED.



BROAD-LEAVED DOCK (RUMEX OBTUSIFOLIUS).



WIREWEED (POLYGONUM AVICULARE).



SMARTWEED (POLYGONUM PERSICARIA).

APIARIES ACT AMENDMENT.

T. W. KIRK, F.L.S.

FOR several years past the necessity for an amendment of the Apiaries Act has been apparent. One was accordingly prepared and submitted to the various beekeepers' associations throughout New Zealand, and approved by the Conference of the National Beekeepers' Association of New Zealand, who urged upon the Government the necessity for placing this law on the statute-book.

Briefly stated, the amending Act passed last session provides for the following :—

(1.) The issue of regulations to prevent the introduction of diseased bees or bee appliances.
(2.) Prevention of the removal from one portion of New Zealand to any other portion of diseased bees or bee appliances.
(3.) Prescribing the way in which diseased bees or bee appliances shall be treated, cleansed, or destroyed.
(4.) The compulsory free registration of all apiaries.
(5.) The inspection, grading, packing, and branding of honey, especially for export.

It will be seen that these regulations when issued will afford the up-to-date beekeeper greater protection from carelessness than has been possible under the old enactment, and will facilitate the work of the Instructors and prove of great assistance in building up a valuable export trade in honey.

Books received.—The first volume of the Stud-book of the Clydesdale Horse Society of the Dominion of New Zealand has been received. It is a well-compiled and attractively-got-up book. The entries total 2,052 pedigree Clydesdales. Included in the introductory matter are some interesting notes on the breeding of the Clydesdale horse in New Zealand.

I have found that the Ruakura experience of feeding dry crushed oats to calves is absolutely sound. In my own case it has reduced mortality, and has ensured excellent development of the calves, so essential to the securing of a robust constitution, that factor of first importance in profitable dairy stock.—*A. Donald, Featherston.*

AGRICULTURE ABROAD.

NATIONAL CONGRESS OF AGRICULTURE.

The following account of the proceedings of the Tenth National Agricultural Congress, held at Ghent last year, is from the report in the *Journal of the British Board of Agriculture,* which was based on an article by M. Henry Sagnier which appeared in the *Journal d'Agriculture Pratique,* and which was utilized for this purpose by M. Sagnier's kind permission :—

The work of the Tenth International Congress of Agriculture was subdivided into five sections : (1) Rural economy ; (2) agricultural sciences and education ; (3) animal industry ; (4) rural engineering ; and (5) forestry.

Rural Depopulation.—The programme of the section dealing with rural economy attracted considerable attention. This was particularly the case in connection with the question of rural depopulation, which was the subject of an excellent report by Dr. Ernest Laur, director of the Ligue des Paysans Suisses. The conclusions which he submitted led to a long and animated discussion, which was eventually closed by the adoption, with some modifications, of Dr. Laur's conclusions. Briefly, these were as follows :—

The constant regeneration of the industrial population of the towns by immigration from the country is indispensable to the general prosperity of the people, and to hinder this immigration would certainly not be advantageous. It is obvious, however, that the emigration of the country population ought in no case to assume such proportions as to reduce the agricultural population below its normal level.

The system of small and medium-sized farms is that which gives the largest return from the soil and the largest economic revenue, but apart from this it has the additional advantage of assuring a constant renewal of the life of the towns by the immigration of the surplus agricultural population.

The measures which Dr. Laur recommended should be taken to secure the maintenance of the rural popluation are,—

(*a.*) The adoption of an agricultural policy favouring the formation of small holdings.

(*b.*) The development of the technical side of agriculture by such means as agricultural education, experimental stations, distribution of information and advice, grants in aid of improvement of land, and of live-stock breeding, &c.

(*c.*) The encouragement of small holdings, and the sale of produce by methods of agricultural organization, &c.

(*d.*) The prevention of insect and plant pests ; insurance against damage done by hail, fire, and accidents ; insurance of animals, &c.

(*e.*) The general encouragement by the State of measures favouring agricultural production.

Small Holdings.—Resolutions were proposed by M. Jules Bénard with reference to the organization of small holdings, and were, after some discussion, adopted by the meeting. These resolutions were to the effect that—(1.) The creation of small holdings is the best means of retaining men on the land. (2.) The quantity of land placed at the disposal of the agricultural labourer should be sufficient to attach him to the soil. (3.) Loans granted by mutual agricultural credit societies for the purpose of creating small holdings afford excellent security, and Governments should therefore encourage them by all means in their power. (4.) The object to be aimed at is to encourage the formation of small property which cannot be seized for debt, rather than small leasehold tenancies. (5.) It is desirable to facilitate the rapid redemption of loans made for the acquisition of small holdings, especially by the reduction of the rate of interest. M. Méline proposed the following resolution, which was adopted : " The Congress is of opinion that legislation in various coun-

tries should facilitate the transfer of land, and that it should equalize as far as possible the conditions governing the transmission of real and of personal property, notably in connection with sales, rights of succession, and the procedure of partitioning."

Agricultural Co-operation and Insurance.—M. Rieul-Paisant presented a report on the general principles of agricultural co-operation and the best conditions for their application, while M. le Comte L. de Vogüé discussed the subject of mutual agricultural insurance in various countries. The conclusions thus arrived at were that the application of co-operation to insurance against agricultural risks is to be advocated both on account of its economic and moral effects, and that the intervention of the State in the functions of mutual-insurance societies should be so regulated that the societies should not lose their true co-operative character.

Organization of the Trade in Agricultural Produce.—In connection with this question it was pointed out that the difference between the price paid to the producer and that paid by the consumer often attains exaggerated proportions which justify legitimate protests, and that this state of affairs is common to all countries. M. Albert Henry, secretary of the Société Centrale d'Agriculture de Belgique, proposed certain resolutions in favour of public authorities endeavouring to take action with a view to the rational organization of the trade in agricultural produce.

Agricultural Credit.—In a very interesting report M. le Baron L. de Hennet described the functions of agricultural credit in different countries. After considerable discussion it was agreed that there is a pressing need for suitable systems of credit, and that agricultural credit is best secured by means of small mutual banks of limited extent strongly grouped and controlled.

Agricultural Research.—In a very complete report M. Toussaint examined the methods followed or to be followed in agricultural research. The principal discussion was relative to the number of plots which should be used in a field trial. It was recommended that at least three plots should be used for each trial.

Agricultural Meteorology.—Under this head recommendations were made urging the desirability of agriculturists having some knowledge of scientific meteorology such as would enable them to interpret weather-charts.

Selection and Breeding for Milk-production.—After hearing a report on this subject by Mr. Andrew Sloan the section came to the conclusion that external characteristics are not sufficient indication of the milking-capabilities of a cow, and that the milk-record is the only reliable guide.

Destruction of Forests.—The steps that should be taken to prevent wasteful working or destruction of forests which are of value to the community at large formed the subject of several papers, and, after considerable discussion, resolutions to the following effect were adopted :—

(*a.*) That the different States should lighten taxes which are imposed in relation to forests, and should encourage the conservation of forests and the production of full-grown trees ;

(*b.*) That the different States should encourage the acquisition of forest property by associations, &c., and should endeavour to extend the forest areas held by corporate bodies, and more especially those held by the State ;

(*c.*) That all forests the conservation of which is of importance to the public should be subject to systematic treatment ; and

(*d.*) That the various countries should devise means to make private owners agree to a voluntary submission of their woods to the forestry regulations.

SOIL-FERTILITY.

By FRANK T. SHUTT, M.A., in the *Agricultural Gazette of Canada.*

THE agricultural mind has been somewhat disturbed in recent years by certain pronouncements of the Bureau of Soils of the United States Department of Agriculture respecting available plant-food in soils, the influence of plant-growth upon succeeding crops of the same character, and the part that manures and fertilizers play in farming practice.

The fundamental proposition of the bureau was to the effect that analysis has shown that all cultivable soils contain the mineral elements of plant-food—phosphoric acid and potash—in amounts largely in excess of the demands of crops, and that, as a result, while the greater part of this store exists in insoluble forms, the soil solution—the water in the soil present as a film of fluid surrounding the

soil particles and from which the root-hairs absorb their food—is practically constant in composition and in degree of concentration for all soils. This means, according to the bureau, not only that all soils naturally contain a sufficiency of available mineral food to meet the requirements of crops, but also that soils do not differ in productiveness by reason of varying degrees of richness in these mineral elements. The water-supply and the physical condition of the soil permitting the movement of this supply to the feeding-roots accounts, says the bureau, for the relative productiveness or fertility of soils.

If all this be true, phosphatic and potassic fertilizers and, indeed, all manures are unnecessary, and cannot influence crop-yields by furnishing additional plant-food. But such fertilizers can and frequently do markedly increase yields. This is an established fact, and the bureau offers an explanation in its statement that crops excrete specific toxins or poisons that render the soil uncongenial or injurious to succeeding crops of the same kind, and that the action of manures and fertilizers in the soil is that of an antidote, rendering these toxic substances harmless to vegetation, thus restoring fertility.

These views, as here outlined, have not been widely or generally accepted either by the practical farmer or the agricultural chemist, for neither the experience of the man on the land nor the experimental work of the scientist has lent them any confirmation or support. Indeed, we may say, by inference, that the weight of evidence adduced alike from ordinary farm practice and experimental data is overwhelmingly in the contrary direction—that soils do differ in fertility following generally their relative plant food-content, that manures and fertilizers increase the amounts of available plant-food in the soil, and in consequence thereof increase crop-yields, and that the same crop may be grown for many years consecutively on the same soil successfully, provided the deficiencies in plant-food consequent upon crop-production are from time to time supplied and the soil maintained in a favourable tilth.

Naturally the new philosophy emanating from the Bureau of Soils has been challenged, and many agricultural chemists on both sides of the Atlantic have engaged in the controversy. In the United States Professor Hopkins, of the Illinois Experiment Station, has for several years taken a leading part in the endeavour to show the fallaciousness of the bureau's views. So far as the writer is aware, however, we are now for the first time in possession of results from a systematic and comprehensive series of experiments planned and carried through to ascertain the correctness of these views. We refer to the investigations of Mr. A. D. Hall and his colleagues, Dr. Brenchley and Miss Underwood, undertaken at the world-famous Rothamsted Experiment Station, and the results of which have recently been communicated to the Royal Society of London in a paper entitled " The Soil Solution and the Mineral Constituents of the Soil." This work has been most thorough, and every point that might directly or indirectly bear on the theories promulgated by the bureau has been carefully and critically examined. It constitutes without doubt one of the most scientific, exhaustive, and convincing investigations in agricultural research in recent times. It is one of the greatest importance to the farming community, for it re-establishes most firmly our belief in the value of manures and fertilizers as sources of plant-food, and disposes of the toxin theory as one entirely without foundation.

The agricultural expert will naturally consult the paper for the plans of the investigation, the details, and the analytical data; the conclusions reached by the authors will suffice for our present purpose, and these will be given as succinctly as possible. In the first series the growth of plants was determined in soil solutions made by extracting with water soils from certain of the plots from wheat and barley fields the treatment of which with fertilizers for sixty years was known. One of these plots had received no phosphoric acid, another no potash, during this period. The growth of wheat and barley plants in these several solutions was ound to be parallel to the growth of these crops on the field.

Secondly, it was found by analysis that the relative composition of the soil solutions was similar to that of the soils from which they had been obtained, judged either by the " total " or the " available " plant-food present—proving, among other things, that the plant-growth in the soil solutions was relative to the composition of the solutions. These results were checked by further experiments in several ways, and in every instance results were obtained in strict conformity with those recorded. It was also shown that " growth in the soil solution agreed with the growth in artificial-culture solutions containing equivalent amounts of phosphoric acid and potash," and that " growth in the soil solutions from imperfectly manured

plots was brought up to the level of that in the solutions from completely manured plots on making up their deficiencies in phosphoric acid and potash by the addition of suitable salts."

The toxin theory was completely upset by the results from an elaborate series of experiments. It was shown that "wheat grew as well as barley on the solutions of the wheat soils, and *vice versa*," and it should be remembered the soils from which these solutions were prepared had grown crops of wheat and barley respectively consecutively for a period of sixty years—a period surely sufficiently long for a toxin, if such were present, to have accumulated to such a degree as to exercise an injurious influence. Other plants—lupins, buckwheat, and sunflower—were also used in the test, but their growth indicated nothing that would lead one to suspect the presence of any poisonous principle. Further, boiling the soil solutions—an operation which might be supposed to destroy any toxin present—did not affect in any way the development of the plants subsequently grown in them. Thus we may conclude the toxin hypothesis is finally and conclusively disposed of.

Other and important results bearing on the teachings of the United States Bureau of Soils were obtained, but the main conclusions have been outlined, and they very emphatically show that we have been right in the belief that it is the composition of the soil solution that determines the growth of the plant, and that this will be dependent upon the composition of the soil; in other words, other factors being favourable, crop-yields will correspond to the degree in which the fertility of the soil is maintained or increased by the addition of manures and fertilizers.

Once more has Rothamsted placed agriculture under a debt of gratitude, and Mr. Hall and his co-workers are to be congratulated on their splendid piece of research work in agricultural science. Our thanks—the thanks of the farming community everywhere—are due them for so satisfactorily and conclusively clearing up certain phases of the problem of soil-fertility which in recent times have been the subject of much controversy.

THE FLAVOUR OF BUTTER INJURED BY METALS.

THE effect which the presence of minute quantities of iron or copper may have on the flavour of butter has been the subject of investigation by the experts of the Dairy Section of the United States Agricultural Department.

According to their report, very small amounts of these metals in the cream cause certain undesirable flavours to increase in intensity during storage. These flavours are often designated as "metallic," "oily," or "fishy." Experiments were carried out using known quantities varying from one to five hundred parts to a million parts of cream. The butter was stored and examined at intervals varying from 20 to 187 days. The most noticeable feature was the rapid development of bad flavours in the butter containing the iron. Butter made from cream which had stood in rusty cans developed a peculiar taste easily picked out. The influence of copper was even more marked than that of iron.

The work shows that if cream is kept in rusty cans, or comes in contact with iron or copper during the process of buttermaking, it may take up iron or copper from rusty cans, exposed boltheads, or other metal parts of pasteurizers or churns in sufficient quantity to affect the flavour of storage butter.

While there is nothing to show that the nature of the flavour is appreciably changed, it does demonstrate very clearly that the rate of development of the undesirable flavour is greatly accelerated during storage by very small quantities of iron or copper.

FRUITGROWING IN GREECE.

THE Government of Greece, in order to encourage the development of the fruit industry, for which the country is said to be eminently suited, is about to set up model establishments at many centres to carry out experiments—(1) in fruit-cultivation; (2) production of trees for distribution on a large scale; (3) experiments with different stocks and varieties and their acclimatization and uses; and (4) the training of skilled men for fruit-tree work.—*Bulletin of the International Institute of Agriculture.*

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

Primrose McConnell.

As a rule, the weather during the month of July is wet and inclement, interfering much with cultivation-work.

Oats may still be sown if the land is sufficientiy dry, but no attempt should be made to carry out this work when the land is wet. On the other hand, a successful crop of wheat is often obtained after a wet seed-time.

Previous to sowing, all cereal seeds should be treated with blue-stone or formalin, as a preventive of smut. The formalin solution is easily prepared, and is very effective. The strength used at this farm is 1 in 400, which means 2 tablespoonfuls to 10 quarts of water. Some authorities recommend 1 in 450. The seed should be spread out on a clean floor and sprinkled with the solution, the heap being turned over repeatedly until every grain is wet. It is a good plan to prepare the seed in the evening, leaving the heap covered with empty sacks overnight. The seed should be refilled into clean sacks in the morning, and sown at once. One gallon of the solution will treat 4 bushels of seed. An alternative plan is to steep the grain in the solution for five minutes and spread out to dry. No harm arises from leaving the treated seed in the sacks for a few days, but the longer it is kept after treatment the greater will be the risk of injury to the germination. A knapsack sprayer makes a very effective sprinkler, but where this is not available a watering-can is the best substitute.

The ploughing of land intended for root crops should be pushed ahead at every opportunity. Land ploughed early and deep will retain infinitely more moisture than that ploughed late and shallow, and the danger from drought in the coming season will be

minimized. All paddocks should be ploughed as near to the fences as possible. This not only gives a more finished appearance, but also destroys a favourite harbour for plant parasites and weeds. For this purpose it is necessary to have a special bridle, which is made with one side considerably lengthened.

During wet weather chain-harrowing of pastures may be carried out with good effect. This work should never be omitted.

Every farmer should keep a daily record of all work carried out on the farm. Each field should be numbered or named, and the variety of crops grown, their treatment and results, should be carefully noted; also a record of the weather. The writer has kept a farm diary for thirty years, and he believes it to be of the utmost importance. On an ordinary farm an average time of five minutes each day will be found ample for this work.

The dairy-farmer will be entering on his busy time, and if he is wise he will have made up his mind to cull the "boarder" cows of last season. It is necessary, however, to use some discretion in this matter, especially in the case of a heifer, which may sometimes make an indifferent first season and yet prove to be a good cow later on. Also, many cows seem to have an "off" season in which they fall very considerably below their average. It is wonderful what results may be had by studying the cow's temperament. When hand-milked, and the milkers often changed, some will withhold their milk entirely, but when milked regularly by one competent hand will make an excellent season. No matter what a cow's temperament may be, however, she will not give her best when roughly treated. A first-class attendant will be able to approach and handle the majority of his herd in the paddock.

The question is often asked, "What is the best green fodder for summer use?" Where it can be successfully grown, lucerne surpasses everything else, whether used green or as hay. During the past season the green lucerne was used at the Ruakura Farm of Instruction with the best results. Those intending to sow an area with this invaluable fodder during the coming spring should have their land ploughed and limed without further delay. On no account omit the lime, except it is absolutely certain that the land contains a sufficiency. All experiments go to prove that lime is one of the main essentials in successful lucerne-growing.

Dairy-farmers who are using nondescript bulls should, if possible, procure one from a reliable milking-strain for use during the coming season; the outlay will be amply repaid. In Denmark it is customary for a group of farmers to join forces and purchase a first-class bull, each member being allowed the use of the bull for a few of his best cows only. A valuable animal should never be

allowed to run with the herd. If he is kept separate he will serve a large number of cows.

Where no shelter-hedges are in being, they should be planted as soon as possible. With a good shelter-belt and a liberal supply of well-got hay, the cows will successfully face the roughest winter. It will go hard, however, with those wintered on a bare, wind-swept paddock with no supplementary feed.

At Ruakura last season the first crop of lucerne was made into silage seven days after cutting, being then in a semi-dry state. To assure sufficient moisture, the stack was liberally watered during building operations. It is somewhat difficult to get comparatively dry material sufficiently solid round the outside of the stack, and there is more waste than when the material is green; but otherwise the silage in this instance was a success, and eaten with relish by the dairy herd. In any case the lucerne-plants should be mature before cutting for ensilage, as the flavour is much better.

I would advise those who are fortunate enough to have a supply of mangels to lead the roots to the pastures daily, instead of turning the cows on to eat their fill of unripe material, because it is not only wasteful but exceedingly dangerous, particularly where dry hay is not being fed.

Rock salt should be in every pasture.

For the winter months draught horses should be clipped from above the knee to midrib. This does almost as much good as an extra feed of corn per day. The careful ploughman will be constantly on the outlook for sore shoulders and chafed sides. As regards the shoulders, it is essential to keep them clean, and when washed they should be thoroughly dried. A good horseman will always put the comfort of his horses before his own, and if his employer does not provide sufficient feed he will procure it without leave. When the horses are taking their midday feed from a nose-bag the collars should be removed; it is impossible for the horse to eat with any comfort when the whole weight of the collar and hames is hanging on the head and jaws.

Early lambing will commence this month, and, where there is a comparatively small flock, it should be brought as near the homestead as possible, and ewes and lambs turned off, as soon as the latter can walk, into a clean paddock. The increased price of both sheep and lambs warrants much more care than is generally taken in lambing-time in New Zealand. The small prices of a few years ago engendered careless habits, as the loss of a few lambs was not of much account, but present prices demand more careful attention in this direction. During the lambing season the writer has often gone three weeks at a stretch without undressing to go to bed.

Respecting the crutching of in-lamb ewes, in small flocks, which lamb early in the season, I feel quite confident it is a mistake, as it leaves a delicate part of the body exposed. All sheep stock should be moved from field to field as often as possible, as it is one of the main essentials in successful sheep-farming.

THE ORCHARD.

W. A. BOUCHER.

JULY can hardly be regarded as an ideal month for the planting of orchard lands. In many localities, owing to climatic conditions, the soil is not in a suitable condition for working. It is, therefore, better to postpone operations, and at a later period set out the trees when the soil is warm, friable, and moist but not wet. In the meantime consignments of trees arriving will require to be heeled in. This process has already been described in the pages of this *Journal*, but may be outlined again for the benefit of those who have not had the opportunity of reading the earlier numbers. For heeling in, a trench is prepared with plough or spade in moist, friable soil. The trees are laid in the trench either singly or in small bundles. Loose earth is then shovelled in, shaken among the roots, and pressed down firmly with the foot in order to prevent as far as possible any air-circulation among the roots during such time as it may be necessary for the trees to remain in the trench.

SPRAYING.

Advantage should be taken during the month of July of any favourable opportunities that may occur for spraying for the control of various orchard pests and diseases. This is recommended especially when the red oil is to be used for the control of mussel scale, red spider, and mealy bug. One or another, or perhaps all three, pests are to be found in many orchards, and no effort should be spared to keep them well in check. In this connection it may be as well to point out that only well-tested and reliable spraying-compounds should be used. The principal cost of spraying is in the labour employed, and not in the material purchased for this purpose. There is, therefore, nothing to be gained, but much to be lost, by endeavouring to save a trifle in expenditure on the cost of materials which, after application, will prove ineffective in result. It is noticeable that fruit well grown, well graded,

NOTE.

FOR mussel scale, red spider, and mealy bug spray with red oil emulsified, for the preparation of which the following directions are given: –

RED-OIL EMULSIONS (WINTER FORMULÆ).

To be used when trees are quite dormant. Early application is recommended – say, July or August. Spraying with oil late in the season when the buds are swelling is apt to destroy them. Any red oil, provided it has a specific gravity of over nine hundred, is suitable for winter spraying.

Proportions.—4 lb. special soft soap, 4 gallons red oil, 68 gallons cold water.

Preparation.—To make the emulsion, put the soap into a tub and pour 2 gallons of boiling water over it. Stir briskly to a good lather, and add the oil Now make use of your spray-pump, put both delivery and suction ends of spray-pump hose into the tub, and work the pump steadily for a few minutes—this will cause a perfect emulsion; now add the 66 gallons of cold water and the mixture is ready for use.

Some growers prefer to use the red oil in the proportion of 1 gallon of emulsified oil to 10 or 12 gallons of water, instead of in the proportion of 1 to 17.

Many dealers now sell emulsified red oil, needing only the addition of 12 to 17 parts of water to be ready for use.

For the fungus diseases mentioned in these notes spray with the

BORDEAUX MIXTURE (WINTER FORMULA),

for apple-scab, pear scab, and parasitic fungi generally, especially those attacking the peach. In the case of the peach, if possible, spray twice, the first time just after the leaves have fallen, and again just as the buds begin to swell, taking special care to cover the young wood.

Proportions.—10 lb. sulphate of copper, 10 lb. fresh roche-lime, and 40 gallons water.

Preparation.—Dissolve the 10 lb. sulphate of copper in 2· gallons water, slake the 10 lb. lime slowly, and make up to 20 gallons; strain this milk of lime into the solution of sulphate of copper, stirring briskly. This should be used within eight hours of mixing, otherwise its value as a fungicide is largely depreciated.

[*To face p. 648.*

and well packed will when opened for inspection show infection by red spider, mealy bug, or mussel scale. None of these pests should be found on fruit coming from a carefully sprayed orchard, provided that well-tested and reliable spraying-compounds have been used. This phase of the question of spraying is one that presents considerable difficulties to Fruit Inspectors when examining consignments destined for local consumption or for export. With the steady expansion of the export trade each year, it becomes more imperative than ever that orchard pests and diseases should, as far as possible, be eliminated. Complete eradication can hardly be expected, but infection can be reduced to a minimum, provided that satisfactory spraying-compounds are carefully and thoroughly applied at the right periods of the year.

Canker.

In some localities this disease has recently been causing considerable trouble and anxiety to orchardists, some varieties of apples especially being subject to severe injury. Special attention should be devoted to any outbreak of canker. Every portion of the affected wood should be carefully cut away, care being taken to prune back to healthy wood that shows no trace of infection. All diseased prunings should be carefully gathered and burned, and the trees sprayed in due course with the Bordeaux mixture (winter strength).

Pruning.

In order to avoid unnecessary pressure of work later on in the season, the orchardist should avail himself of such opportunities as may occur for pruning his trees. In the case of the commercial grower, this important operation usually receives the attention that it deserves, but the domestic grower not infrequently leaves trees untouched season after season until they become oversized for convenience, economy, and effectiveness in spraying, and overcrowded with useless limbs. Complaint is then made of the difficulty experienced in producing fruit free from pest and disease.

Plum-pocket (Enoascus pruni).

Of late years numbers of specimens of plums affected by this fungus disease have been received, especially Japanese plums. Growers will have noticed that in many localities the buds of Japanese plums will be almost open before the end of July. It is therefore advisable that as a preventive against plum-pocket the trees should be sprayed before the buds are too advanced with the Bordeaux mixture (winter strength).

LEAF-SPOT OF THE GOOSEBERRY (SPHAERELLA FRAGARIAE).

With regard to the early opening of the buds, the remarks already made in connection with Japanese plums apply also to the gooseberry. Leaf-spot has at times caused serious loss to growers, and for this reason the plants should be protected against attacks by the application of the Bordeaux mixture (winter strength).

ROOT-FUNGUS.

In some of the lighter soils throughout the Dominion apples, plums, and gooseberries more particularly are subject to attack by root-fungus. This disease, operating below the soil-surface, will frequently not be discovered until the trees are fatally injured. In soils subject to root-fungus growers are recommended to take precautionary measures by applying early in spring a soil-dressing of sulphate of iron. The quantity to be used will vary according to the class of fruit and the size and age of the trees or bushes to be protected. Approximately the quantities will be from ½ lb. in the case of gooseberries up to 3 lb. or 4 lb. in the case of grown trees. The sulphate of iron should be lightly worked into the soil.

THE VINEHOUSE.

S. F. ANDERSON.

IN the cool vinehouse all pruning should be completed this month. Mention has been made in the notes for May condemning the practice of early pruning—that is, before the vine has cast its leaves in a natural manner. After this stage—at least, for some weeks—there is little chance of a vine "bleeding."

To what has been stated in previous notes on the mistaken view taken by some growers with regard to early pruning, I would add that shortening in the green shoots during autumn and also pruning in close while there are green leaves still on the vine, instead of assisting the development of the buds, is really harmful.

We know that in the case of the vine the bud is a little storehouse of vital energy capable of producing an individual vine when placed in the right conditions. The buds always occur at the axil of a leaf (with the exception of a few clustered at the base of a shoot). Strong healthy buds are only to be found in connection with large healthy leaves. It must follow, therefore, in the case of a deciduous plant like the vine, where the growth

put forth in spring is so vigorous, that the proper time must be given it to store every atom of energy the leaf can impart. Where the pruning is done too soon some of this energy must be lost.

Late Pruning.

A few remarks may be made on the error of late pruning. There is not the same amount of evil done, generally, by late pruning, because the grower is usually alarmed at his vines "bleeding," and for this reason he avoids cutting them late in the season. A considerable period will elapse between the falling of the leaves and the commencement of growth in the spring, so that there is ample time to attend to all the necessary work in the vinehouse. It is best, however, to commence as soon as possible after the leaves have fallen. Directions for the pruning of the vine are furnished in Bulletin No. 40 (new series). This can be obtained from any branch office of the Department.

After pruning and painting the rods as advised in former monthly notes, and before tying them up in their places, it may be necessary to arrange them at better distances apart. In many houses they are placed much too close. To expect to get good results when rods are only 18 in. to 24 in. apart is out of reason. It is natural that a grower should be loth to cut out good rods, but 3 ft. is the least distance that should be permitted between the rods. Where rods are showing barren places or showing very weak laterals, good eyes or buds at the base of the old rod, anywhere between the ground and the top-plate, may be selected to produce fresh rods. In growing these new rods there is no waste of the vine's energies, but actual recuperation of loss. The old rod may be kept until the new one is grown so that in the meantime there need be no loss of fruit. (See also notes for November, 1913.)

THE POULTRY-YARD.

F. C. Brown.

Current Problems.

July may fairly be considered the most important month of the poultry year. As success in poultry-keeping depends upon the class of stock kept, it is obvious that the time of mating is the vital period. Even to the man who has the very best types of birds in his laying flock the selection of the breeders is the

most important feature of his year's operations, for it is no guarantee that having great layers one year the new crop of pullets will be equally good or even approximately so. It is not given to every man to select the ideal breeder, even though he may have a fair eye for laying-form or be possessed of trap-nest records; and if he fail to mate to the best advantage it is probable that the egg-producing standard instead of being raised will decline. It is impossible, indeed, to attach too much importance to the selection of birds for the breeding-pen. We often hear it said that there is no such thing as type, and that the egg-record is the only thing to go by. Of course, this is nonsense; but too much stress can easily be laid on judging by form, just as equally great mistakes can be made by attaching too much importance to the egg-record. The ideal breeding-hen must conform to the laying type, must have the constitutional characters pronounced, and, if possible, an egg-record behind her. The male must possess the first two characters and be descended from a known family of heavy egg-producers. There is something more required, however. The breeder should be in the very nick of condition on being placed in the breeding-pen. Thus, however desirable a hen may be as a breeder, she must have had ample time to recover from an exhausting laying season. If she has been such a consistent layer —a most desirable quality—and is in consequence a very late moulter, she should not be bred from if she has not fully recuperated and is not in a vigorous condition when required for the breeding-pen. Birds bred from the heavy layer and late moulter which have entered the breeding-pen before recovering condition will often be found to be weakened in type and resembling very much inbred stock. It is, indeed, problematical if it is advisable to breed from the record layer which has been forced in production, and has in consequence been taxed to its utmost laying-capacity. It is rather significant in this connection to note that the owners of winning competition pens are ready to sell their winners at very little above their ordinary market rates, a proof that successful practical breeders realize the weakness in using the forced producer as a breeder. This opinion is based on bitter experience. I have bred from winning competition and high trap-nested and forced pens, only to find that the progeny were weakened specimens, unprofitable as producers, and most undesirable as breeders. Of course, it is advisable to have hens for the breeding-pen with a record behind them, but not a record secured under extreme forcing conditions; and having birds with such a record they should be well recovered from their laying season and be in the best condition when placed in the breeding-pen.

There are certain indications of laying-quality possessed by birds of all breeds, but there is a distinct danger in attaching over-importance to these. For instance, good bone, clean smooth face, and fine texture throughout are most desirable, but there is a point at which the possession of these characters may indicate a weakness, especially in the male bird. It is essential to have a hen built on fairly fine lines, providing she has the necessary timber; but there should be a certain robustness and indication of vigorous constitution in the male which is to head a breeding-pen. Look for strength rather than refinement in all breeding-stock.

I have been besieged with requests recently for advice in regard to ovarian troubles. In practically every case it was an easy matter to put one's finger on the spot—the development of egg-laying power at the expense of constitution. It is advisable—nay, necessary—to give a forcing diet to the heavy layer, especially during her unnatural laying season, but a bird must have a sound and vigorous constitution to stand such treatment. If it would be only realized that the great artificial production of the present-day types of layers makes a greater strain on the animal economy than in the case of any other animal and its product, the vital importance of breeding laying-stock of the most robust type under the most favourable conditions, and treating them in the best possible manner, would at once appeal to the poultryman.

No doubt the practice of inbreeding has been responsible to a considerable extent for much of the weak stock at present being bred. Inbreeding is a two-edged sword. It is an admitted fact that the remarkable advance in type effected by the most notable breeders of British live-stock was only brought about by inbreeding, and close inbreeding at that; but the work was carried out by master minds who, while working to their ideal, never ignored the fact that if an animal is to throw similar or improved types to himself he must first of all be of exceptional prepotency. Constitution was their signpost, and they allowed no sentiment to interfere with their work of culling. To succeed in inbreeding a man must know exactly what he is doing, must have a very keen eye for form, and must discard every bird as a breeder which does not approach the desired standard. Even if the stock has come from the best birds on another breeder's plant, and not from the culls, they must be reared under the best conditions to stand up against a forcing diet, especially when highly concentrated meat substitutes are heavily fed in mashes irrespective of what amount each bird requires. I have known cases where blood-meal was liberally added to the morning mash, and where ovarian troubles were rife in consequence. Immediately, however,

the owners followed my advice and, mixing the blood-meal with a little pollard, placed the concentrated meat substitute in a hopper from which the birds could help themselves according to nature's demands the trouble vanished. Under this system every bird secured a nourishing meal with its morning mash, and could help itself at any time to the special egg-forming stimulant. The mixing of a nitrogenous concentrate with the morning mash means that the poorer layers obtain too large a share of it and the better layers too small a share. Thus the stimulant is harmful to the former and is insufficient for the natural craving of the latter. Where there is any weakness in constitution the harmful effect of the oversupply of forcing food materials is obviously more pronounced.

One thing which must not be neglected in July is feeding the breeding-stock to the best advantage. It would be well, therefore, to mate at once, so that the breeding-pens may receive special care and attention, and be well settled down and be in good nick before their eggs are required for hatching purposes. Early mating has the advantage that infertility and other troubles which take place with recently mated stock is not generally experienced, as all the birds will have had full opportunity to settle down to their natural modes of life. While high records should not be expected from hens in a breeding-pen, they should be fed well on a nourishing diet. This should contain very little meat or substitutes of this, but there should be an ample supply of green stuff, charcoal, shell-grit, &c. Exercise is likewise most important; indeed, the breeders should be kept under as natural and as healthy conditions as possible. A little variation in the food-supply is desirable.

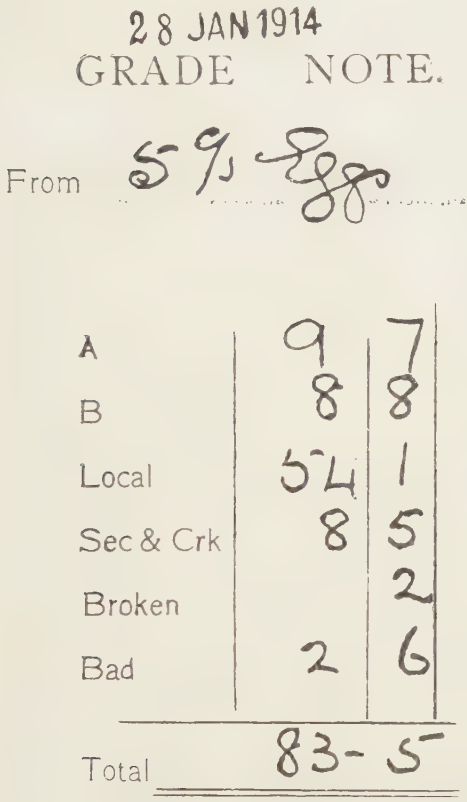
POULTRY-SHOWS.

It is gratifying to see that utility poultrymen are taking a greater interest in the poultry-shows of the Dominion. The societies promoting exhibitions of poultry are displaying a commendable spirit of progressiveness in catering well to breeders of utility stock. Fanciers and utility breeders have now come to a much better understanding with the common recognition of the fact that poultry can possess utility qualities and yet be desirable types of their respective breeds. Breed points must never be overlooked, for, if ignored, deterioration of type would certainly result. The poultry-show is the best means of checking this evil, and therefore should be supported by all who have the best interests of poultry at heart.

EGG-QUALITY.

That the vast majority of eggs that reach the market are of inferior quality is well known to any one who is interested in the

actual marketing of them, as well as to all who have made even a cursory study of this question. Yet every egg, it may be truly said, was a first-grade product when it was laid. The loss to producers through the deterioration of eggs all due to rough-and-ready methods of keeping poultry and carelessness in handling the egg-product — must equal at least 25 per cent. of the total income from egg-production. It must be remembered that the value of the poorest eggs in a line invariably determines the value of the whole of the line. True, the city buyer gets something more for the choicest eggs in a line than could the producer, but to secure this he must test, grade, and repack, and this means time and expense. He may even get a high price for the choicest eggs, but he will probably make nothing on the inferior, while bad and cracked eggs will represent a dead loss. Recently I had an opportunity of inspecting the books and grade-notes of a city egg-dealer who keeps a strict account of each line he handles—this being imperative in many cases, as he often grades and repacks on commission. Some sample lines may be quoted: In the month of September a line of 505 dozen contained 120 dozen A grade, 139 dozen B grade (these grades being fit for cool storage), 222 dozen "locals" (must be marketed at once), 23 dozen "cracks," and 1 dozen bad. A little later a line of 619·5 dozen was registered. Of these, only 4 per cent. were as good as the whole line should have been, the figures being: 25·11 dozen A grade, 96 dozen B grade, 402 dozen locals, 84 dozen cracks, and 11·4 dozen bad. These were not exceptionally inferior lines, but were average lines picked out at random. It is obvious in view of the economic waste disclosed that there is great need for reform in the methods



A TYPICAL GRADE-NOTE.

of producing and handling eggs on the part of small farmers — the men who produce the bulk of the eggs of the Dominion.

THINGS TO REMEMBER.

Strong germs in the eggs cannot be secured if the fowls and houses are infested with vermin.

Poor feeding is not conducive to high records.

The flavour of eggs is largely influenced by the quality of the food supplied to the birds that lay them.

Constitution, laying type, and breed points are the main essentials in mating the breeding-stock.

It is a wise policy to have on hand reserve males for the breeding-pens.

The strongest germs are invariably found in eggs laid by birds that have a free range.

Crooked breast-bones are mostly the result of allowing young stock to roost too early.

It is more profitable to keep twenty good fowls than double the number of indifferent ones. If a small flock cannot be made to pay it is useless attempting to conduct the business successfully on a larger scale.

THE APIARY.

F. A. JACOBSON.

DURING the next few months there will be very little to do in connection with beekeeping. Manipulation of the colonies must cease on account of the cold weather, and other work of this nature may be set aside until the spring. The chief thing is to see that some colonies do not starve, as losses of this kind, when made up in the spring or early summer, detract considerably from the honey crop. To secure an increase in colonies without material loss of strength in the individual hive requires a large amount of time and labour, and should a bad spring be experienced expense will also be incurred. It pays, therefore, to look after colonies already formed, and from 30 lb. to 35 lb. of honey should have been left at the disposal of each colony during the winter: Strength is thereby assured in the spring. Do not at any time disturb the cluster of bees. Should it be found necessary to give additional feeding, it should be placed alongside the bees inside the hive. A comb of clean sealed honey or a cake of

candy is the best. Some beekeepers prefer to feed sugar-syrup in the spring, and so stimulate their bees to start brood-rearing earlier than they otherwise would do. This is sometimes advantageous and even necessary, but at the same time a colony will always do better if left an abundance of stores.

A great deal of advice may be gleaned by the perusal of a leaflet entitled "Foul-brood in Bees, and its Treatment," recently written by the officers of the Apiaries Division, and which may be obtained free of charge on application to the Division of Orchards, Gardens, and Apiaries, Customhouse, Wellington.

THE GARDEN.

W. H. TAYLOR.

VEGETABLE-CULTURE.

Asparagus.—The old-fashioned plan of narrow beds is still followed in many places. Old customs die hard. It is an essential part of this kind of culture that a lot of manure must be used. Very heavy feeding is absolutely necessary where roots are so crowded. The proper course to pursue with these beds is to strip off as much as is possible of the top soil and cover the roots with fresh manure. This is done early in winter, soon after the top growth is cut off. After this course has been pursued for several years the top stuff stripped off will be little but old manure, differing in character according to the manure used. In farm gardens it is probable that cow or sheep manure will be largely used, and very good these manures are. Either of these will leave a larger residue than would stable manure, and, being now deprived of all rankness, may be put to garden uses, for which it is frequently hard to find material. It will not rob the bed in the least to take away a considerable proportion of this top stuff. It can be replaced as far as is necessary—with ordinary soil, ashes from rubbish-fires, and sand — and be used for raising seedlings in boxes. With the addition of a little sand it will be suitable for improving the soil round choice plants and bulbs, either as a top-dressing or putting around the roots when planting, and also for mixing with loam and sand for potting plants. For these purposes it should be wheeled away and stacked in a moderately dry place—not under cover, but where water cannot accumulate around it. Keep it and its surroundings free of weeds, which may encourage eelworms and certainly will encourage slugs.

Adverting to the treatment of the asparagus-bed, the manure that is placed on it should be left uncovered until shortly before it is time for the plants to grow, when it should be covered with soil and given a dressing of salt.

Seakale.—I am a strong advocate of the culture of this vegetable in all large establishments. Country gardens should, I think, be furnished with everything of the best. Seakale will never become a common vegetable; not that it requires much attention or skill, but it does demand a little too much of both to be undertaken where no gardener is kept. Seakale is possessed of a flavour so mild that every one appreciates it, and it has a good appearance on the table. Just a few roots of seakale are not of much use. This vegetable should be a part of the establishment of the garden, and the plantation should have about a hundred clumps of plants. It is not time yet to plant, but a plot may well be reserved for it. The sets are planted three in a clump, 30 in. from centre to centre. The plot should be in the most accessible place near a path, because of the labour of wheeling manure to and fro. Established crowns may be forced at any time while not in growth. The mode of doing this is to cover with boxes, minus bottom and top, a top cover to be laid on loose. Then surround with fermenting manure at least 12 in. thick. At the time of natural growth any clumps not forced may be covered without manure, but be careful to exclude all light. After crowns are cut, remove the manure and leave the covering lid off. After a few days the box may be taken away to cover other clumps or put aside. When cutting the heads take with them a little of the old stem, so as to keep the head intact. Before covering, dust some lime about the clumps to destroy any slugs there may be, or they may spoil the heads.

Rhubarb.—I have explained before how the winter varieties may easily be raised from seed, and have also pointed out the advisability of frequently renewing the beds in this way. In the light of further experience I am more firmly convinced of the wisdom of this course. I now believe that these varieties may with advantage be treated as annuals, if desired. On the 29th November last we sowed seed in unmanured ground at the Arataki Experimental Farm. For two months the seedlings scarcely moved, owing to excessive heat and dryness of soil; we are now pulling good sticks over 20 in. long. I am satisfied that the best way to get plants is from seed, but it is necessary to get the seed from a good stock. I would advise any one wishing to take up the culture of these varieties not to rely upon purchased roots, except for producing seed. A few good roots planted in spring would produce seed in time for sowing next season. Seed should be saved from the best

specimens. They produce seed very readily. Better results may be obtained in this way than by relying upon seed from an unknown stock, although, of course, after-selection can be made. The quickest results are obtained when the seed is sown where the plants are to grow, thinning to the necessary distance apart. At first 12 in. apart is sufficient, but as they stool out cut out half the plants. Transplanting makes work that is not compensated for, and if that plan were adopted the seed would have to be put in earlier, for transplanting arrests progress. Summer rhubarb is still a necessity if large sticks are required. The winter varieties produce all the time, but the sticks are thin and would not find sale in summer. For a purely home supply, however, my conviction is that the winter varieties are the more profitable, being more easily cultivated and more certain to succeed. I would advise that for those purposes the summer kinds be discarded. These last-named will now have died down. An essential to their success is a large supply of manure—a good supply of humus appears to be necessary to their well-being. The clumps deteriorate if left for a number of years. They should be lifted every third year and divided. Two or three good crowns are enough for each set, and the large roots with which they are furnished need not be retained. The clumps may be dug up at once and stacked in any convenient place. Neither rain nor a few degrees of frost will hurt them. The time for replanting is when the crowns show signs of renewed activity. Dividing should be delayed till then.

Cabbages and Cauliflowers.—The plants raised from seed sown at the end of March or early in April should now be ready to put out. In most places they will be, though I know that in some places they will not. It is not wise to put them out when they are too small. If they are ready, it is as they should be, and the produce will begin to come into use about the middle of October. The soil should be rich. If a good supply of manure has been dug in, so much the better; but where this is not available, or is not in sufficient quantity, blood-and-bone manure may be given. Cabbages for this crop may be planted rather close, 20 in. in the rows and 24 in. between the rows. The manure may be broadcasted just before planting. About twice as thick as one would sow grass-seed will be sufficient. More than one variety of cauliflower should be planted. The reason for this has been explained in former articles. The early varieties require less room than the late kinds, which grow to a large size: 2 ft. each way will give room for Early London and Early Snowball varieties. Autumn Giant, Metropole, and similar kinds require 6 in. more. Artificial manure applied for these should not be spread broadcast; rather throw down before planting a

small handful where each plant is to go. Then some of it will fall in around the roots at planting-time.

The gardeners' spring may be said to commence when seed-sowing becomes general, and is in advance of the calendar in most places. This time cannot be stated exactly for all parts. For the North Island generally it will be early in July. It is a bad policy to put in seeds before the ground is fit to receive them and before growing-weather can be assured. It is equally bad to delay when those conditions can be reasonably counted upon. The ruling factor should be judgment, which can be acquired only by local experience.

Peas may be sown in all parts now. Good early sorts are: Daybreak, Carter's Springtide, English Wonder, Richard Seddon. At the same time sow a second early to succeed them. Sherwood, Te Aroha, Sutton's Dwarf Defiance are some of the good varieties. I like to dust a little soot over the seed after sowing, but before covering them up. The soot protects the seed and newly germinated plant from insect pests, and greatly improves growth. In the absence of soot I put a little bonemeal in the drill before sowing the seed.

Onions.—Those sown in autumn will be ready for transplanting shortly. Get them out as soon as they are large enough; the earlier the better. Large kinds of the Ailsa Craig and Rocca types should be planted from 10 in. to 12 in. apart, with 15 in. between the rows. If wood-ashes are available do not neglect to spread a good supply on the ground before planting. I always keep a lot in a dry shed for the purpose. Soot is the king of onion-fertilizers; do not be afraid to use plenty. Basic slag has given me good returns. This fertilizer should be spread so as just to dust the ground over. When transplanting onions do not try to make them stand upright if they are of any size, or the roots will be in too deep. If they lie slantwise on the ground they will lift as soon as they start to grow. I prefer to plant by first drawing a shallow drill with a marker. Lay the plants on their sides with the roots just down one side of the drill. Draw back the soil and tread firm.

Onion-seed should be put in as soon as conditions are right. Get the ground into good condition first, and make it firm by treading, or rolling, or by use of the log-leveller if the area is large. Never sow in loose ground, which militates against a good take of seed, and is not favourable to after-growth. The foregoing remarks about manuring hold good for the seed-bed also.

Broad beans should have been sown before now. Where this work has not been done it should be proceeded with at once. Lettuces may be planted, as soon as fit, from the autumn sowing.

Plant a good bed. They stand well, and give the best heads of the season.

Radish and a little Early Horn *carrot* may be sown in small quantities.

SMALL FRUIT.

Raspberries should be freed of the dead canes, and the living ones reduced to about six of the strongest. Cut off the immature tops of those left, cutting down to where the cane is of a fair thickness. Clear away and burn all the prunings. Fork the ground over and leave it clean. Give a mulch of manure if possible. Where the clumps are very strong the ground may be so full of roots as to make digging difficult. In that case do not attempt it. I like to see them so, and rely on mulching to keep weeds down, hoeing out those which do come.

Black currants bear fruit mostly on young wood. All short growths should be left intact, but longer shoots may be shortened somewhat, for the tops of these are not, as a rule, well ripened. There is no need to keep an open centre to these bushes—in fact, it is rather a detriment to do so. It is desirable to renew the bush frequently by working up new main branches, removing the old to make room for them. The borer is always more or less troublesome. By keeping the wood young, however, serious damage is prevented, the older branches being removed before the borer has had time to destroy them. Give plenty of manure.

Red and White Currants never bear on year-old wood. All the side shoots should be shortened back to about three-quarters of an inch to form spurs. The fruit is borne on spurs that are two years old and more. Some of the spurs are manufactured in the way described, while some are natural. Sometimes natural spurs get too long. When they are too long too many bunches come on them, with a consequent weakness of each bunch. When this occurs reduce the size of the spur. As the fruit is borne in the manner indicated, it will be evident that the bushes must have plenty of light to all parts, otherwise the spurs would remain undeveloped. An open centre must, therefore, be kept, or as near it as can be managed. I do not wish to imply that a good lot of fruit may not be got from a bush in any other form; on the contrary, I know that it can. I also know, however, that a proper crop cannot be secured unless all parts are well exposed. The outer parts may fruit well, but the lower and inner parts will give but little fruit. Every part should bear equally well. It happens, unfortunately, that the only kinds that fruit well in this country are difficult to train. The growths are heavy and brittle, and are easily

broken off by strong wind. No one need, therefore, be disappointed if they are not able to grow perfect bushes, such as are seen in pictures. Get as near to perfection as you can. Any one who has bushes that do not bear fruit would do well to cut them out and get the right kinds. Some varieties never bear fruit here. Good kinds are those of La Versailles type, which include Chenanceaux, Bertyn's No. 9, and Cherry Red.

Gooseberries bear on spurs and the young wood with equal freedom. This causes many ways of pruning to be adopted. In some places it matters but little which way is availed of. In the colder districts the open bush spur-pruned is no doubt best. Spur-pruning rigidly pursued is not good in hot districts or on light soil, the bushes becoming enfeebled and dying out. A freer way of treatment is more profitable in such places. When gooseberry-bushes are spur-pruned all over there is a tendency to push out a large number of shoots. As is but natural, those shoots, if left to grow, crowd the bush, so they are usually kept pinched back. In some cases this repression leads to the death of the bush, as pointed out above, but doubtless the evil would be less if the shoots were allowed to grow after being pinched back once or twice. I am in favour of a less restrictive mode of training and pruning. I believe in looking to the young wood for a good part of the fruit, keeping a fairly open bush, but not rigidly cup-shaped, and renewing branches occasionally, just as in the case of black currants.

FLOWER-CULTURE.

The present is a time for overhauling beds and borders rather than doing the final digging over, which it is as well to leave till every necessary work in the way of transplanting and pruning has been done. Many kinds of perennial plants deteriorate after two or three years, and should in some cases be renewed entirely. In other instances they should simply be divided and the small sets replanted. In the case of subjects of the habit of perennial phlox, which die right down to the ground, the entire clump should be dug up. First of all, however, dig up with a fork a few of the strong offsets from the margin of the clump, and reserve them for replanting. It is the inner portion of the clump that deteriorates, and all this should be discarded.

Penstemons and calceolarias become too woody when old, and lose vigour; both are easily raised from cuttings. Penstemons strike easily in the open ground, and calceolarias in a semi-shaded place, but it is rather late to strike these in the open ground. They strike with great freedom in boxes, surfaced with sand, in a shady

frame. Mark with a good label the site of every plant which dies down below the surface. Many plants are lost by neglect of this. Even the owner cannot remember exactly where all the plants are, and they may be chopped up with the spade before they are discovered. Every label should have the name of the plant written on it. Names last longest and are most distinct if written on wet white-lead. If the label is painted and the paint allowed to dry before the name is written, not only is the name often not very distinct, but it comes off with the paint. The best way is to rub some white-lead well into the wood, leaving scarcely any on the surface. Write the name at once. Write rather hard, so that the pencil sinks into the wood. Written in this manner the names last for years.

Planting of all kinds may be done now. There are many inquiries as to trees and shrubs with coloured autumn foliage. The deciduous azaleas are remarkable in this respect: many of them look very beautiful in autumn, the foliage taking on all shades of gold, crimson, and bronze. The foliage of these, however, should never be cut in sprays, as to do so would injure the plant, or, rather, rob it. The single leaves may be taken, and are useful for many purposes, both for personal and house decoration. I consider this race of plants to be one of the finest, the flowers of different varieties including all shades of yellow and red tints. They are very gorgeous when in flower, and not without attraction when not in flower. They are bare of foliage only a very short time, just during the three winter months. Among foliage plants proper the Virginian creeper is a perennial favourite. This does well on any kind of support—a tree-stump, an arbor, a brick wall, or trained up wire netting. *Photinia glabra* is one of the finest of evergreen shrubs. Many of the leaves fall in autumn, and these are brightly coloured crimson and gold. Their size and glossy surface render them valuable for decorative purposes. Maples, liquidambar, scarlet oak, various thorns (*Crataegus*), *Berberis Bealei*, *Enkianthus japonicus*, *Nandina domestica*. These are some of the best. The last-named should be in every garden. The foliage is large and spreading, but divided into many fine segments almost like maidenhair fern. It is beautiful at all times. The foliage of the varieties of sumach—*i.e.*, *Rhus cotinus*, &c.—is very fine and distinct.

Pruning Roses.—Now is the time to prune. Hybrid perpetuals and hybrid teas are very similar in growth in many varieties; those of the latter class that approximate closely to the former may be pruned in the same manner. First cut out dead wood, unripe shoots, and weak wood; cut out clean from the starting-point. Then cut out any shoots that will be likely to crowd the centre

when new growth is made; cut these right out. Cut the remaining shoots back to from four to six eyes, according to strength; cut the weakest hardest. Cut to an outward bud so as to direct growth from the centre. This pruning is for garden purposes; if show blooms are wanted cut harder back, but there will be a smaller number of flowers. Hybrid teas that approximate more to the habit of teas should be pruned less heavily. Adopt the same measures regarding dead and unripe wood, but sound, well-ripened shoots should be not much more than tipped. The last directions are suitable for tea roses. Climbing-roses may be classed together. Roughly stated, the aim should be to keep young wood, cutting out old to make room for it. Strong young rods should always be kept. If there are old rods that must be retained, cut back all the shoots that flowered last year to spurs of two or three eyes. Briar roses: Cut out dead wood. Leave all young shoots: they should form a bush from 4 ft. to 6 ft. high with laterals unpruned. Moss roses: These should push up strong young shoots from the base. Shorten them, as well as laterals on older wood, to from four to six eyes, making a bush about 2 ft. high.

C. E. Cuming, photo.]

Best-of-all Scarlet Runner at Moumahaki Experimental Farm.

One of the best of scarlet runners, very large, and remaining stringless until near maturity. It has a good flavour, and is an excellent market bean.

THE HEMP INDUSTRY.

W. H. Ferris.

The fibre delivered at the grading-stores last month was for the time of year of exceptional volume, but with the end of the month the deliveries fell rapidly away, indicating the end of the exporting season, the bulk of the fibre now reaching the stores representing the final strippings. The quality of the majority of recent lines was anything but satisfactory, due, no doubt, to the fact that they were largely composed of poor descriptions of hemp held back from shipment during the season; in other words, fibre retained by the miller in order that his principal shipments might be as uniform in quality as possible.

It is satisfactory to know that an increasing number of millers are taking advantage of the off season to clean up their swamps, put the drains in good order, and overhaul, and in some cases renew, their plants. There are very few mills in New Zealand at the present time which are not equipped with the latest labour-saving appliances, and the owners of the few which are being worked under old methods are postponing the introduction of improved processes in anticipation of a better system being introduced by reason of the Government bonus for a new method of treating phormium-fibre. By the end of next month it is probable that the work of inspecting the processes of inventors competing for the bonus will be completed.

London agents are again complaining of the weakness in the New Zealand system of marketing fibre—not maintaining regular and uniform shipments throughout the season, and thereby preventing manufacturers securing constant supplies. This, it is contended, has the inevitable tendency to drive phormium-fibre off the market, to the advantage of competing commodities. The manufacturer will always favour the product which he can secure from month to month and season to season. These remarks apply with even greater force to tow, as it is not so easy to obtain a substitute for this by-product as it is for phormium-fibre itself. The supply of tow has been declared to have been below the demand existing for it during the past season on Home markets.

At the Waerenga Experimental Farm the total sales of wine for the month of May amounted to 502 gallons, valued at £162 7s.

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of May :—

WHANGAREI.—Apples : Only very late varieties left, of which there is a heavy crop. Lemons : Prospects maintained. Pears : Nearly finished ; only store fruit being marketed now. Oranges : Prospects of good average crop are still maintained. Several growers around Whangarei have got their stone-fruit pruning well advanced. Generally speaking, growers have experienced a good season so far as weather is concerned, and a decrease in disease-infected fruit on the market has been very noticeable during the season, much more interest being shown in spraying operations.—*J. W. Collard.*

AUCKLAND NORTH.—Apples : Late varieties still in fair supply at good prices. Lemons : Trees looking well. Orchardists are busy preparing ground for planting, but have been delayed by very cold wet weather during the month.—*W. C. Thompson.*

AUCKLAND SOUTH.—All fruit is now gathered, and growers are proceeding with winter spraying.—*N. R. Pierce.*

HAMILTON.—The end of the month marks the close of another fruit season. All varieties are gathered, late keeping varieties of apples being placed in storage. Peach-pruning has commenced, and many growers are preparing for the first application of Bordeaux mixture. Ploughing is proceeding apace in orchards where owners believe in clean cultivation. The weather during the month has been rather wet and cold, and frosts were very heavy for the time of the year.—*T. E. Rodda.*

HASTINGS.—During the month late varieties of apples were coming forward in large quantities, and local cool stores are now practically full. With the exception of the Dougherty, the season's crop has now been practically gathered. Pruning, spraying, and general orchard-work is now under way. Peaches and other stone-fruits have made a good recovery after the drought and heavy crops of the previous year, and if all goes well there should be a very good crop of these fruits next season.—*J. A. Campbell.*

POVERTY BAY.—Very little fruit is now left, except a few pears and late keeping apples. Of the latter, Ballarat Seedling is the main winter variety, and in some orchards the crop was exceptionally heavy. The Sturmer, Rokewood, and Dougherty have also done well, but are mostly from young trees. Exceptionally heavy rains, high winds, and floods have been general during the month, and I am informed that considerable damage was done by the latter, portions of some orchards being inundated, late apples washed away, and a considerable deposit of silt left behind.—*W. R. L. Williams.*

WANGANUI.—Harvest is practically completed. The cold, windy, and wet weather of the past fortnight closed the season swiftly. The season has been good, and closed with a sharp demand from overseas buyers. Strawberry-beds are getting well under way for the early summer crop.—*W. C. Hyde.*

PALMERSTON NORTH.—The apple and pear crops are all picked, large quantities being stored. Good prices are being obtained. Taking the district all through, the season has been a very satisfactory one, especially in the Manawatu. The Wairarapa suffered badly from late frosts during the blossoming-period. Growers are turning their attention to pruning and spraying, and in some instances land is being prepared for planting.—*G. Stratford.*

WELLINGTON.—Winds and heavy rains have been the means of bringing large quantities of fruit to the ground. This weather has continued for a fortnight, and quite hindered all orchard operations. Late apples are fair and bringing fair prices. There are still a few late pears on the trees, but these seldom meet with

very good prices. They are mostly of cooking varieties. All other fruits, with the exception of lemons, may be considered over. Tomatoes have done fairly well this season, and prices were the best ever experienced. Blight fairly well under control.—*T. C. Webb, jun.*

NELSON.—All fruit is now gathered. Growers are turning their attention to pruning and making preparations for the season's planting, which promises to be a record. Everything is nearly finished for the season, there being only one more shipment to go forward.—*J. H. Thorp.*

BLENHEIM.—Apples are nearly all harvested. Considerable damage has been done by leaf-roller caterpillar, so spraying with arsenate of lead until end of March has been advised. This pest seems to be at its worst in that month. I have also recommended that the fruit be kept thinned; where apples are in clusters the pest does most damage. Lemons are looking well, and there is every prospect of a good crop for next season. The remainder of the tomato crop has been spoilt by heavy frosts. The walnut crop is nearly over. There has been only a medium crop this year. All other fruits have been harvested.—*B. G. Goodwin.*

CANTERBURY AND WESTLAND.—With the exception of a few small lots of apples, grapes, and tomatoes, all fruits are now harvested. Generally speaking, the fruit has been fully up to expectations, and there are at present some very fine lines of Sturmers, Ballarats, and Wolseleys in store in Christchurch. Pruning and the general cleaning-up of orchards is now in full swing.—*W. J. Courtier.*

CHRISTCHURCH AND SUBURBS.—Apples are turning out better than was anticipated, but there is a slight decline in price. Black-spot has been troublesome. Late varieties of pears are a light crop. Many are affected with black-spot. A good many bunches of late varieties of grapes are still hanging and turning out well. Winter tomatoes in hothouses are only a medium crop, and are now on the market. Outdoor tomatoes are over.—*G. Esam.*

TIMARU.—All varieties of fruit are now harvested. Owing to the severity of the weather experienced during this month trees were rapidly defoliated. Hares are troublesome, and smears have been advocated where gardens are not enclosed with rabbit-netting. Walnuts will be scarce on account of so many being destroyed by being left under the trees exposed to the weather.—*A. B. Mansfield.*

DUNEDIN.—All fruit crops are now harvested, and pruning and other winter operations are in hand.—*W. T. Goodwin.*

HONEY PROSPECTS.

THE Director of the Orchards, Gardens, and Apiaries Division has received the following reports concerning the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—Honey is in demand locally, good prices being obtained for both first and second quality. Beeswax also is scarce, 1s. 5½d. being offered for good clean lots. Ten tons of first-quality honey was exported to London per "Zealandic" on the 31st May by the Waikato Beekeepers' Association; but of this only 3½ tons was graded. The balance, being still in a liquid state, could not be graded, but was shipped by the owners in preference to waiting another month. —*G. V. Westbrooke.*

WELLINGTON.—With the exception of a small quantity in Hawke's Bay, the whole of the crop in Poverty Bay, Hawke's Bay, Taranaki, and Wellington districts has been gathered. The operations of the New Zealand Honey-producers' Association, with headquarters in Taranaki, have been instrumental in disposing of a large quantity both locally and abroad. The company practically controls the whole of the Taranaki output. Owing to the smallness of the crop this season, prices are slightly in advance of last year.—*F. A. Jacobsen.*

CHRISTCHURCH.—Honey is selling freely, and prices are firm. The best sections are commanding 5s. 6d. to 6s. per dozen, and choice extracted honey in bulk is realizing 4¼d. to 4½d. The end of April completed the first year of grading honey for export to overseas markets under the supervision of the Department. 1,126 cases were graded and exported. Grading has already proved of great benefit to the industry. Canterbury honey has commanded good prices: the majority of the consignments sent to the Home markets brought £45 and £46 10s., and in several instances as high as £50. Prior to the introduction of grading a few isolated beekeepers sent an occasional shipment, prices ranging from £36 to £40. The above figures show quite a substantial increase, and beekeepers have every reason to be well satisfied.—*L. Bowman.*

DUNEDIN.—Supplies of honey are very short, and, save for a small consignment of 14 cwt., the market has been practically bare. A keen demand exists for first-grade lots, and beekeepers whose honey is up to standard will find a ready market in Dunedin. Once again it is necessary to urge upon beekeepers the advisability of putting their honey in new packages if they expect to obtain satisfactory prices. The first consignments of pat honey have opened up in splendid condition. It is pleasing to note the improved methods of packing adopted by pat-honey producers. Prices are unaltered.—*E. A. Earp.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

THE Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of May:—

AUCKLAND.—The markets have been fairly well supplied with seasonable fruits throughout the month. A good many lines of apples coming forward have been rather inferior, and absolutely no attempts have been made at grading or packing. Lower prices and a poorer demand have been the consequence, and auctioneers and buyers complain of the inferior fruit put on the market. Prices fell a little towards the end of the month, especially in apples and pears. The following prices may be taken as a fair average for the month: Apples, superior dessert, 7s. to 9s.; others, 4s. to 6s.; cooking, 5s. to 7s. Pears, dessert, 8s. to 10s.; cooking, 5s. to 6s. Grapes, hothouse, 9d. to 1s. 2d. per lb. Tomatoes, hothouse, 7d. to 8d. per lb.; tree-tomatoes, 2s. to 3s. per case. Persimmons, 3s. to 3s. 6d. Lemons, prime, 8s. to 10s.; inferior, 4s. to 5s.—*C. Berridge.*

WELLINGTON.—Supplies of local fruit are coming to hand in fair quantity but of poor quality. Many lines had to be destroyed during the month owing to the quantity of scale on them. In a number of cases packing and grading are still poor. Pears are arriving here too ripe, especially the Keiffer's Hybrid. They are kept too long, and open up badly bruised, with juice running out of the cases. This kind of pear does not sell well in the Wellington markets. Tomatoes are to hand in small supply, but the demand is not great, owing to lack of flavour at this season. Approximate values are as follow:—Apples: Jonathans, 4s. to 8s.; Rhymer, 4s. 6d.; Sturmer, 4s. to 6s.; Ben Davis, 5s.; Sharp's Late Red, 5s.; Alfriston, 5s. 6d.; Cleopatra, 4s. to 6s. 6d.; Lord Wolseley, 5s. to 5s. 6d.; Epp's Seedling, 4s. 6d.; Pippins, 4s. Pears: Conference, 5s.; Winter Cole, 8s. to 10s.; Winter Nelis, 8s. to 10s.; Vicars, 4s. to 5s.; L'Inconnue, 4s. to 5s.—all at per case. Vegetables: Cabbages (choice), 4s. to 6s.; turnips (swede), 2s. 6d. per sack; carrots, 3s. to 4s.; parsnips, 5s. to 6s.; cauliflowers—choice 10s. to 13s., seconds 2s. to 2s. 6d.; pumpkins, 3s. to 5s.; marrows, 2s.—all at per sack; lettuce, 1s. to 3s. per case; leeks, 3d. to 5d. per dozen; melons, 5s. to 6s. per sack; kumaras, 4s. to 6s. 6d. per case; onions, £5 10s. per ton; potatoes, £5 5s. per ton. —*T. C. Webb, jun.*

CHRISTCHURCH.—This month the market was much better supplied with apples and pears, and a slight decline in prices was noted. Quinces were scarce and realized well. Outdoor tomatoes are about done. Average prices for the month were: Apples—dessert, 6s. 6d. to 8s. 6d.; cookers, 4s. 6d. to 6s. Pears—dessert, 4s. 6d. to 6s. 6d.; cookers, 3s. to 4s. 6d. Quinces, 4s. to 5s. Tomatoes—hothouse, 3d. to 6d.; outdoor, 1d. to 2d., per lb. Grapes, 1s. to 1s. 6d. per lb. Chestnuts, 3d. per lb. Walnuts, 6d. to 7d. per lb. Onions, £3 10s. in paddock. Potatoes, £3 in paddock. Cauliflowers are very scarce, and are realizing up to 8s. a dozen. Other vegetables are in good supply and demand.—*G. Esam.*

DUNEDIN.—Supplies of local fruit are now easing off considerably on the Dunedin market, and prices are fairly firm. Consignments consist principally of pears and apples, good samples of which realize very fair prices. The supply of tomatoes is now almost finished for the season, only small lots being available. Choice lots of apples and pears are coming forward from Alexandra, Canterbury, and Nelson, and are eagerly sought after at keen prices. The following may be taken as fair average prices for the month: Tomatoes—local hothouse, 6d. to 7d.; seconds, 1½d. to 2½d. Apples—cooking, 1½d. to 2d.; dessert, 5s. 6d. to 7s. 6d.; Cox's Orange, Ribston Pippin, Jonathan, and similar choice varieties, 8s. 6d. to 11s. 6d. Pears—choice, 2d. to 3d. per lb. Grapes—choice hothouse, 8d. to 1s.; Gros Colman, 2s. to 2s. 6d.; seconds, 5d. to 8d.—*C. Craigie.*

INVERCARGILL.—New-Zealand-grown fruits on this market for the month of May comprised chiefly apples and pears grown throughout the South Island, the principal localities being Nelson, Canterbury, North Otago, Teviot, and Southland. The quality on the whole was very good, and the fruit showed a marked freedom from disease as compared with previous months. Prices current for the month were: Apples—dessert, 7s. to 9s. per case; cooking, 2s. 6d. to 6s. 6d. per case. Pears—dessert, 7s. to 10s. per case; cooking, 5s. to 6s. 6d. per case. Grapes, 6d. to 10d. per lb. Potatoes, £5 to £5 10s. per ton. Onions, 6s. 6d. to 7s. per cwt. Marrows, 6s. per cwt. Cabbage, 3s. 6d.; cauliflower, 4s. 6d.; parsnips, 2s.; carrots, 2s.; turnips (swede), 1s. 9d. to 2s. 3d.—all at per sack.—*R. Hutton.*

Entries for the Winter Show of the Rangitikei Agricultural and Pastoral Association close on the 27th instant.

Agricultural Show Dates.—Canterbury Agricultural and Pastoral Association Spring Show, Christchurch, 11th, 12th, and 13th November, 1914.

In the results for the year ending 31st May basic slag heads the list in the experiments at the Ruakura Farm of Instruction to determine the influence of manures on the feeding-value of pastures. The plots have carried an average of eleven sheep per acre for the past twelve months, such a result being scarcely credible on this land.—*Primrose McConnell.*

In the feeding of green crops to dairy stock it is advisable, if this system of feeding is to have the best results, that hay be also fed to them. Giving a green feed alone, such as oats and similar crops and even turnips, will probably give rise to dietetic troubles. The hay acts as a corrective, especially when well salted when stacked. It is well to give the hay before giving the green feed or turnips. Just after milking is probably the best time to feed.

COMMERCIAL INTELLIGENCE.

PRICES OF MEAT PRODUCTS, ETC., ON SAN FRANCISCO MARKET.

E. CLIFTON.

THE transactions on the live-stock market of San Francisco are conducted entirely on the weight of the animal when alive at the market. The price per pound is the basis of sale, and that price is determined by the quality and, very especially, by the buyer's estimate of the proportion of dressed meat to live meat. The condition and the breed are the chief factors. Well-bred stock in good condition naturally dress the greater weight and command the higher price per pound. The stock is weighed as soon as convenient after the sale is made, and on this the price is computed.

Retail.	C.	C.
Beef—		
Roasting	20 to 22	
Steak, porterhouse	28	
,, tender loin	25	
Sirloin	20	
Round	20	
Boiling	15	
Corned	12½	
Braising	18 to 20	
Lamb—		
Fore quarter	17	
Hind quarter	22	
Chops	25 to 28	
Mutton—		
Legs	16	
Shoulder	12½	
Cops	20	
Veal—		
Leg	20	
Cutlets	28 to 30	
Shoulder	20	
Stewing	18	
Pork—		
Leg	20	
Loin	25	
Shoulder	18	
Salt	18 to 20	
Eggs, per dozen	30	
Butter, per pound	35	

Wholesale.	C.	C.
No. 1 steers	7¼ to	7½
Under 950 lb.	7 ,,	7¼
Second quality	6¼ ,,	6½
Undesirable steers	4 ,,	5
Cows and heifers	6 ,,	6½
Cows and heifers, second quality	5½ ,,	6
Cows and heifers, common, thin	3 ,,	5
Desirable bulls and stags	4 ,,	5
Thin	3½ ,,	4
Milk lambs	6 ,,	7
Sheep—		
Wethers	5½ ,,	5¾
Ewes	4¼ ,,	5
Calves	8½ ,,	9
Medium	8 ,,	8½
Heavy	7 ,,	8
Pigs, hard-grain fed, weighing—		
100 lb. to 150 lb.	8½ ,,	8¾
150 lb. ,, 250 lb.	8¾ ,,	9
250 lb. ,, 350 lb.	7¾ ,,	8
Eggs, per dozen	22 to	22½
Butter, per pound	23 ,,	23½

ARGENTINE SHIPMENTS.

The Department has received the following cablegram from Buenos Aires, dated the 2nd instant :—

The following shipments of produce were despatched from the Argentine to the United Kingdom during May, 1914 (compared with May, 1913) :—

	1914.	1913.
Frozen beef (quarters) ..	91,000	165,000
Chilled beef (quarters) ..	363,000	282,000
Frozen mutton (carcases) ..	96,000	161,000
Frozen lamb (carcases) ..	52,000	61,000
Butter (cwt.)	..	1,565

NEW ZEALAND - EASTERN PORTS U.S.A. TRADE.

Following are the shipments of produce for the east coast of the United States since March last, when the new direct service was inaugurated by the s.s. "Banffshire" :—

	S.s. "Banffshire," 19th March.	S.s. "Roscommon," 21st April.	S.s. "Norfolk," 23rd May.
Mutton, carcases	..	1,500	500
Lamb, ,, ...	..	14,700	8,006
Beef, quarters	..	3,494	3,892
Veal, carcases	..	1,165	1,146
Frozen sundries, packages ..	..	50	1,519
Wool, bales	291	1,022	61
Hemp, ,, ...	1,548	1,992	1,018
Tow, ,, ...	171	..	546
Hides and skins, sacks, &c...	946	684	112
Pelts, casks	381	919	755
Grain, &c., sacks	90	298	170
Gum, packages	1,091	1,525	918
Sundries, packages ..	21	37	226

Messrs. Riley, Gill, and Co., Dunedin, sent a shipment of 2 tons of honey to Britain at the end of last season. The honey realized 46s. 6d. per cwt.

According to Government returns the State forests of Germany cover 10,607,336 acres and bring in £6,084,129 in revenue. This is only 11s. 6d. an acre; but it is estimated that if the land where the forests are situated were used for agricultural purposes, the revenue would be probably far less and possibly not more than 5s. an acre.

Nearly 10 tons of milk and more than 1,260 lb. of butter in a year is the world's record product of the Guernsey cow May Rilma, owned by Captain E. B. Cassatt, at his Chesterbrook farm at Berwyn, near Philadelphia, U.S.A. For the 365 days ended 1st May the cow's record is 19,673 lb. of milk and 1,073 lb. of butter-fat.—*E. Clifton.*

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1914	231,766	464,185	30,424	33	150,492	136,086	108,742	..	500	2,851	15,234	4,306	11,133
,,	*1913*	*166,714*	*229,179*	*6,886*	*611*	*109,251*	*63,864*	*118,986*	..	*329*	..	*6,969*	*2,215*	*4,110*
February,	1914	354,190	334,207	14,100	3	86,570	59,532	127,372	..	4	..	3,709	633	7,607
,,	*1913*	*326,337*	*403,698*	*12,666*	*64*	*89,098*	*81,733*	*127,968*	..	..	..	*12,520*	*4,295*	*7,973*
March,	1914	446,522	551,313	36,689	..	61,060	62,732	95,175	..	..	..	8,187	2,562	3,958
,,	*1913*	*86,224*	*210,166*	*7,428*	*250*	*47,560*	*59,844*	*49,661*	..	*115*	..	*12,552*	*7,662*	*4,043*
April,	1914	234,765	366,786	22,185	..	7,822	63,796	58,488	..	2,901	..	1,247	888	5,909
,,	*1913*	*303,937*	*647,948*	*16,834*	*457*	*11,358*	*52,934*	*61,988*	..	*300*	..	*9,049*	*3,351*	*3,889*
May,	1914	336,632	638,397	39,315	54	837	37,776	43,364	3,623	11,062	..	8,355	2,112	9,316
,,	*1913*	*418,221*	*731,520*	*22,073*	*100*	*637*	*46,304*	*33,281*	..	*265*	*2,000*	*15,751*	*5,005*	*9,057*
June,	1913	315,034	528,815	24,444	588	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439
,,	*1912*	*170,738*	*287,697*	*24,605*	*221*	*558*	*7,712*	*18,138*	*9,160*	*7,622*	*2,039*	*5,646*	*1,168*	*1,213*
July,	1913	215,713	331,353	14,030	..	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793
,,	*1912*	*291,097*	*371,474*	*29,457*	*210*	*684*	*1,255*	*16,567*	*44,324*	*23,216*	*20,573*	*7,463*	*1,856*	*5,892*
August,	1913	161,593	178,263	13,129	6	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406
,,	*1912*	*207,239*	*157,589*	*10,478*	..	*559*	..	*10,409*	*42,580*	*38,802*	*19,562*	*3,758*	*523*	*4,219*
September,	1913	133,122	83,521	5,334	16	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049
,,	*1912*	*44,657*	*40,759*	*1,174*	..	*8,723*	*1,204*	*6,671*	*15,742*	*17,363*	*19,933*	*2,957*	*501*	*3,671*
October,	1913	14,122	25,735	580	..	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923
,,	*1912*	*51,263*	*15,393*	*3,882*	..	*49,962*	*16,389*	*4,647*	*7,952*	*64,480*	*5,396*	*4,193*	*401*	*9,075*
November,	1913	20	1,479	..	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314
,,	*1912*	*54,175*	*8,286*	*282*	..	*140,751*	*57,181*	*33,305*	*3,680*	*40,896*	*13,892*	*9,866*	*1,911*	*5,466*
Deecmber,	1913	128,087	86,890	8,909	..	249,526	124,821	51,385	..	250	24,479	19,807	5,276	11,273
,,	*1912*	*117,740*	*106,310*	*4,774*	..	*119,885*	*66,213*	*44,789*	*5,868*	*30,490*	*10,070*	*3,816*	*2,613*	*3,686*

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 31ST MAY, 1914.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1914.							d.	d.	d.	d.	d.	d.															
March 7	..	..	..	..	..	..	..	4½	..	6⅜	4½	4	116/0	126/0	64/0	66/6	72/0	25/5/0	22/10/0	..	25/15/0	22/15/0	..	..	..	..	..
,, 14	..	..	..	..	..	..	..	4½	6½	6½	4½	4	114/0	124/0	63/6	65/6	71/0	25/5/0	22/15/0	20/10/0	25/15/0	22/15/0	26/10/0	..	..	..	..
,, 21	..	..	..	..	..	..	..	4½	6⅜	6½	4½	3⅞	112/0	124/0	63/0	65/0	71/0	25/10/0	22/10/0	27/0/0	25/15/0	23/0/0	26/10/0	..	..	..	..
,, 28	..	..	..	..	..	..	4⅞	4½	6½	6⅛	4½	3⅞	112/0	124/0	62/6	65/0	71/0	26/0/0	23/0/0	26/10/0	..	..	26/10/0	..	..	..	..
April 4	1/4½	1/4½	1/5	1/8½	1/11	2/4¾	4⅜	4½	6½	6⅛	4 7/16	3¾	108/0	124/0	62/0	64/6	71/0	25/10/0	22/5/0	25/15/0	26/0/0	22/10/0	26/5/0	..	..	..	..
,, 9	..	..	..	..	..	..	4⅜	4⅜	6½	6	4⅜	3⅝	108/0	120/0	62/0	64/6	71/0	25/15/0	23/0/0	20/0/0	..	..	..	..	..	..	..
,, 18	..	..	..	..	..	..	4⅜	4⅜	6½	6	4⅜	3½	108/0	116/0	62/6	64/0	71/0	26/0/0	23/0/0	26/10/0	..	..	26/15/0	..	..	..	..
,, 25	..	..	..	..	..	..	4⅜	4½	6½	5 15/16	4⅜	3½	108/0	116/0	62/0	64/6	71/0	27/0/0	25/10/0	28/0/0	..	26/10/0	29/0/0	..	..	..	..
May 2	..	..	..	..	..	..	4½	4½	6½	5 15/16	4 7/16	3⅜	108/0	113/0	62/0	64/6	71/0	26/10/0	23/10/0	27/10/0	26/10/0	23/10/0	27/10/0	..	..	..	.
,, 9	..	..	..	..	..	..	4½	4⅜	6½	5 15/16	4 7/16	3 7/16	108/0	114/0	61/6	63/6	71/0	26/0/0	23/0/0	27/0/0	26/10/0	23/10/0	27/10/0	..	..	..	
,, 16	.	..	..	.	..	..	4⅜	4½	6½	6⅛	4½	3 7/16	108/0	115/0	61/0	64/0	72/0	27/0/0	23/15/0	27/0/0	..	24. 15/0	27/10/0	..	.	..	.
,, 23	..	..	..	..	..	..	4⅝	4⅜	6 5/16	6⅛	4½	3½	108/0	115/0	60/0	63/6	70/0	26/10/0	23/10/0	26/10/0	27/0/0	24/0/0	27/0/0	..	..	..	.
,, 30	..	..	..	..	..	..	4⅝	4 3/16	6⅜	6½	4½	3½	110/0	116/0	60/6	64/0	70/0	26/10/0	23/10/0	26/10/0	26/15/0	23/15/0	26/15/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

MAY.

Hemp.—The total number of bales graded was 8,891, as compared with 17,107 for the corresponding month of last year, a decrease of 8,216 bales. For the twelve months ending 31st May, 1914, the number of bales graded was 143,556, as compared with 137,169 for the previous twelve months, the increase being 6,387 bales.

Tow.—During the month 3,257 bales were dealt with, as compared with 5,128 for the corresponding month of last year, a decrease of 1,871 bales. For the twelve months ending 31st May, 1914, the number of bales graded was 46,888, as compared with 47,003 for the previous twelve months, a decrease of 115 bales.

Stripper-slips.—During the month 79 bales were passed for export, as compared with 855 for the corresponding month of last year, a decrease of 776 bales. For the twelve months ending 31st May, 1914, the number of bales passed was 4,167.

On the 11th ultimo the grading-store at Napier was destroyed by fire, consequently no grading was done at that port during the month. Over 500 bales of hemp were destroyed in the conflagration.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF MAY 1914.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	305	772	364	98	40	..	1,579
Napier	..	..	..	..	..	..	..	..	..
Foxton ..	..	..	714	1,398	598	154	20	..	2,884
Wellington ..	..	..	553	1,395	1,075	196	15	4	3,238
Blenheim ..	..	114	87	..	..	..	..	..	201
Picton ..	..	88	70	1	..	..	..	..	159
Lyttelton ..	..	10	..	..	..	23	..	..	33
Dunedin ..	..	..	54	120	7	1	..	..	182
Bluff	..	..	264	323	24	4	..	..	615
Totals ..	..	212	2,047	4,009	2,068	476	75	4	8,891
Percentages of totals	..	2·39	23·02	45·09	23·26	5·35	0·84	0·005	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	12	203	487	70	762
Napier	..	..	..	..	..
Foxton ..	119	411	51	..	581
Wellington ..	60	477	403	25	965
Blenheim ..	37	88	..	..	125
Picton	..	117	..	..	117
Lyttelton ..	..	246	10	..	256
Dunedin ..	..	63	24	14	101
Bluff	31	57	245	17	350
Totals ..	259	1,661	1,211	126	3,257

Stripper-slips.—Passed for export: Foxton, first grade 18, second grade 27—total, 45; Wellington, second grade 32. Condemned: Wellington, 2.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since February last:—

—	"Moana," 30th Jan.	"Aorangi," 27th Feb.	"Tahiti," 27th March.	"Moana," 24th April.	"Willochra," 27th May.
Gum, packages	44	16	8	16	..
Seeds, sacks	..	..	34	301	65
Grain, &c., sacks	250	33	48	48	52
Meat, cases	431	1,299	261	223	350
Onions, cases	6	8	11	5	17
Potatoes, sacks	20	25	22	6	20
Sundries, packages	469	47	229	144	229
Butter, boxes	2,702	9	7	1	4
Hemp, bales	100	131	484	470	235
Frozen lamb, carcases	2	4	4	3	4
,, mutton, ,,	..	..	..	..	..
,, veal, ,,	..	..	94	104	319
,, beef, quarters	..	..	500	..	200
,, sundries, packages	..	..	..	2	15
Timber, pieces	..	..	..	..	..
Fresh fruit, cases	..	698	9	5	..

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since January last:—

—	"Niagara," 17th Jan.	"Marama," 14th Feb.	"Makura," 14th March.	"Niagara," 11th April.	"Marama," 8th May.
Butter, boxes	20,076	17,406	12,131	9,787	3,753
Mutton, carcases	1,000	100	25	1,545	1,705
Lamb, ,,	1,000	..	186	317	211
Beef, quarters	1,933	652	421	354	880
Veal, carcases	877	402	36	20	..
Frozen sundries, packages	..	33	143	114	523
Wool, bales	17	2	104	96	219
Grass-seeds, beans, &c., sacks	42	..	24	262	34
Hides and skins, sacks, &c.	2,083	2,551	1,320	2,062	3,291
Onions, cases	4,750	2,500	12,026	4,727	320
Sheep-skins, bales	130	161	..	215	128
Jam, cases	135	89	128	110	90
Sundries, packages	1,518	219	99	2,910	3,038
Potatoes, crates	..	38	..	..	..
Kauri-gum, packages	303	300	328	300	480
Hemp, bales	..	..	..	511	122
Rabbits, crates	..	300	..	..	..
Timber, pieces	3,450	66	2	258	112
Eggs, cases	..	1	..	..	..
Meats (canned, &c.), cases	1,605	30	503	1,762	245
Fertilizers, sacks	..	..	..	..	..
Fresh fruit, cases	..	..	7	1,256	1,000

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of May:—

Port of Shipment.	Horses			Sheep.			Cattle.			Pigs.		Dogs		
	To Australia.	To Great Britain.	To Pacific Islands.	To Australia.	To North America.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To London.
Auckland ..	4	..	9	..	..	273	..	25	..	..	86	..	5	..
Gisborne ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Napier ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington	9	..	..	..	..	..	2	..	..	2	..	4	..	..
Lyttelton ..	7	..	..	50	6	..	..	..	..	1	..	2	..	.
Dunedin ..	20	..	..	..	..	..	..	..	..	..	..	..	..	..
Bluff ..	5	..	..	..	..	..	..	..	..	..	..	4	..	..
Totals ..	46	..	9	50	6	273	2	25	..	3	86	10	5	..

Auckland also exported 45 crates of fowls to Pacific islands.

Particulars of horses exported: Thoroughbred—4 stallions, 16 geldings, 1 mare; draughts—14 stallions, 5 mares; ponies—4 stallions, 8 geldings; 1 trotting stallion, 1 hackney stallion, 1 filly.

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of May:—

No.	Description	Sex.	Port of Origin.	Owner or Agent.	Address.
	MOTUIHI ISLAND (AUCKLAND).				
1	Shorthorn bull ..	..	Sydney ..	Gordon Salnay ..	New Plymouth.
2	,, heifers ..	..	,, ..	,, ..	,,
1	,, calf ..	..	,, ..	,, ..	,,
	QUAIL ISLAND (LYTTELTON).				
1	Bull-dog bitch ..	..	London ..	New Zealand Express Company	Dunedin.
1	Shorthorn bull ..	..	Sydney ..	Sunnyside Mental Hospital	Christchurch.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

SHOWER DIP FOR SHEEP.

IN the last issue of the *Journal* a correspondent was informed that the shower dip was impracticable. A reader in the South, who has adopted this form of dipping, writes expressing his entire satisfaction with the method, and refers to the satisfactory experiences with the shower dip in Australia (published in the *Pastoral Review* of October, 1913). The Live-stock and Meat Division of the Department now makes the following remarks :—

The Stock Act of 1908 makes it compulsory for all long-woolled sheep to be plunged or merged in some effective tick- or lice-destroying preparation. Therefore, quite apart from any merit which may be claimed for the shower dip, the Act would require to be amended before any departure from the existing regulations could be recognized by the Department. With merino sheep, the dipping of which is not compulsory in New Zealand, the shower dip may appeal to owners as a good tonic for the skin and a consequent stimulant for the fleece. When so much depends upon successful dipping, as is the case in this country, the Department could not take the responsibility of advocating any system of dipping long-woolled sheep which has not been found in local experience to be efficacious, and this while the method prescribed by the Stock Act has been found thoroughly effective when properly carried out.

ERADICATION OF WEED.

MR. G. A. HAMMOND, Le Bon's Bay, Canterbury :—

Will you inform me as to the proper time of year to cut konini—stuff that is shooting out on country that has been in grass for many years ?

The Fields and Experimental Farms Division :—

Konini, or native fuchsia, is not often troublesome on bush burns except on dark faces. It should be cut down in late spring and summer. If cut in the autumn, vigorous shoots generally develop in the early spring and hinder burning. This tree is one of the most difficult to burn. If only present in small numbers it should be cut down and grubbed out, an operation that can be taken in hand at any period of the year.

LUCERNE.

MR. JAMES MITCHELL, Burnbrae, Mataura :—

I have a 15-acre paddock of good land, a sandy loam with a free open subsoil. I had a fine crop of rape on this land last year; it was eaten off with sheep three times. I fallowed it this summer, ploughed it light at the New Year, and have just finished ploughing again with a good deep furrow. There are a few patches of Canadian thistles, but the working the land has received seems to have killed them. Otherwise there is not a weed. I have read so much about lucerne of late, and was thinking of trying it, but it has not to my knowledge been grown in the district. Would you kindly advise me what quantity of seed to sow per acre, and manure most suitable, and the quantity? I use from 2 cwt. to 3 cwt. of superphosphate and sulphate of potash to all root crops. I have a paddock of drill turnips alongside, all thinned with the hand-hoe; they are looking splendid. Would land like mine require lime? I limed all land I sowed with grass, and the clover last season was a perfect mat.

The Fields and Experimental Farms Division :—

The dry summer, together with the summer fallowing of the land, and the cultivation, accounts for the disappearance of the thistle. The more cultivation given during such a dry period the better: it is a most important factor in destroying weeds.

Your land would appear to be adapted to and in good condition for the successful growing of lucerne, provided the water-table is at least 5 ft. or 6 ft. from the surface of the ground. As the climate of Southland is somewhat cold and wet, it is not particularly suitable for lucerne. Hardy varieties, such as Grimm and Turkestan, would probably suit, but it is somewhat doubtful if Hunter River and Marlborough-grown seed would thrive. These latter are grown extensively elsewhere in New Zealand, being more suited to the milder parts of the country. You could, however, try a *small* area of either of these by way of experiment; or should you care to try hardier varieties directions could be sent you as to where seed could be obtained abroad. Sow from 15 lb. to 20 lb. per acre—the larger quantity should be sown in your climate. Basic slag at the rate of about 3 cwt. to 4 cwt. per acre would be the best form of manuring. The slag should be worked into the soil a month or two before sowing the seed. Lime at the rate of half a ton (burnt lime), or 1 ton of finely ground limestone, should be applied previous to manuring and seeding. Your soil should not be particularly in need of lime, but for lucerne and legumes generally it is highly desirable. The fact that clovers have come away so well after liming is a fair indication that the soil responds to it. Though heavy soils and light non-retentive soils are most in need of lime, yet, owing to the cold and wet climate of Southland, lime will produce good results on almost any soil in the province. The actual test, however, is the most reliable for ascertaining whether it is required, though the increased clover crop is a fairly reliable guide.

LUPINS.

"BERKSHIRE," Opotiki :—

Can lupins be procured in quantities in the Dominion, and at about what price?

The Fields and Experimental Farms Division :—

There should be no difficulty in obtaining lupin-seed from any of the leading seed-merchants in the Dominion. A local merchant quotes as follows: Annual—Blue and yellow, 32s. 6d. per cwt.; white, 40s. per cwt.: Perennial—Blue, 150s. per cwt.; yellow, 168s. per cwt.

Ailment of Dairy Cows.

C. E. N., Halcombe :—

About the time my cows came in last year—say, about August—we had a lot of wet weather in this district. Whether the mud about was the cause or not I do not know, but about half my herd (thirty-five) went lame in one foot only. In thirty-three cases out of thirty-five they went lame in one or other of the hind feet. The first thing I noticed when they went lame was a crack between the two hoofs, then the affected foot got very swollen just above the hoof right up to the next joint. Soon after the skin broke somewhere and matter was discharged. This matter had a very strong and repulsive odour. After a time the animals got so bad that they never put the affected foot to the ground. They just lay about all day and went completely off their milk. They were generally bad for about six weeks or two months. I tried washing the foot every day with warm water with lysol added. With some I used Jeyes' fluid, and with others Condy's fluid. Then I put Stockholm tar between the hoofs. I found the ones on which I used the lysol made a slightly quicker recovery than the others, but all ran a certain length of time before any improvement at all took place. My neighbours, some of whom also had it in their herds, informed me it was only the wet season, and just to let it run its course. To do so, however, meant that the cows affected went dry soon after they came in. I have not been troubled with it since about Christmas until a few days ago, when I found another had taken it. I immediately isolated her, as I did formerly, and started the lysol treatment, but I am afraid the other half of my herd may take it this winter, hence my inquiry for information on the trouble.

The Live-stock and Meat Division :—

From the description given of the cases it would seem probable that the cows had suffered from ergot poisoning, which affects the feet and extremities in a similar manner. Do you know whether there was much ergot on any of the pastures during the summer ? This condition always becomes worse in cold, wet weather. Further, the degeneration of the skin and surrounding tissues of the foot due to ergotism is increased owing to the invasion of the affected parts by suppurative micro-organisms, and in particular an organism which is capable of setting up necrosis or gangrene of the part attacked. Sometimes cases occur having no connection with ergot poisoning, caused solely through the entrance of certain micro-organisms into the skin, and constituting the condition known commonly as "foul in the foot." General treatment consists in giving a laxative composed of Epsom salts ½ lb., nitrate of potash 2 oz., ginger ½ oz., dissolved in a quart of warm water. This may be repeated every fourth day. The affected feet should be thoroughly cleaned and washed in a weak solution of lysol and water, and then the parts should be painted over with a solution of tincture of iodine, 1 part to 10 parts of water. Keep the cows in as clean a situation as possible, and, as far as practicable, avoid paddocks suspected to be contaminated with ergot.

Dodder.

A. P. R. E., Papatoetoe :—

What is the best means of eradicating dodder ?

The Fields and Experimental Farms Division :—

If many plants are not affected the best plan is to pull the affected plants up and burn them. If growing thickly the treatment recommended is to spray thoroughly with a mixture of 1 lb. of bluestone and 1½ gallons of water. The treatment may have to be repeated.

Affected Ewes.

"Subscriber," Taueru :—

We experience considerable trouble here often at this time of the year among the ewes through what appears to be a kind of scald in the feet. It has the effect of causing the bottoms of the hoofs to come right away, leaving the foot quite bare underneath and often in a more or less state of rot. We are in the habit of treating the trouble the same as foot-rot—that is, by paring the bottom loose portion right off and putting the sheep through a trough containing a solution of 3 lb. of arsenic to 14 gallons of water (the arsenic when mixed being put into the water at boiling-point and boiled for half an hour afterwards). Could you please advise whether the paring is necessary or advisable, or whether it would be better to simply put the sheep through the arsenic and leave the loose portion of the hoofs to come off naturally, forming as they would a kind of protection to the bottom of the feet in the meantime? Also, will you please advise whether it is any advantage to warm up the arsenic solution each time before using?

The Live-stock and Meat Division :—

Your treatment is perfectly correct. All loose horn should be removed, and the feet properly trimmed before the animals are put through the bath. Apparently the solution was not properly made. Arsenic is only feebly soluble in water, no matter whether it is boiling or not. What you should have done was to have added an alkali to the arsenic and boiled them both together, when all the arsenic would be dissolved. The alkali usually used is carbonate of potash, or pearlash, the same weight as the arsenic. There is no advantage, once the solution is properly made, in heating it again.

Horse with Swollen Fetlock.

"Inquiry," Weber, H.B. :—

I have a horse with a large soft swelling on the back of the fetlock and the tendon of the front leg. Is there any cure for it?

The Live-stock and Meat Division :—

The swelling is probably what are termed "wind-galls." These are really enlargements of the bursæ in connection with the flexor tendons and the fetlock-joint, due to increased secretion of the lubricating-fluid they naturally contain. The cause is usually hard-and-fast roadwork, jumping, or any work in which the limbs are put to a severe test, especially in young horses that are not properly "set." Except in the early stages, when blistering and two or three months' rest will usually remove them, treatment is not very satisfactory, as they generally return when the horse is put to work again. They rarely, however, cause actual lameness. You do not say what age or class your horse is, or how long the condition has been present, so it is difficult to say whether it can be cured.

White Lupin.

Mr. J. Beckett, Island Bay :—

I am sending under separate cover a sample of white lupin which I have growing. Would you kindly tell me if it is the same as illustrated in the February issue of the *Journal*?

The Biologist :—

The sample sent is white lupin (*Lupinus albus*). It is the same as illustrated in the February *Journal*.

SHEEP-FARMING.

"COCKATOO," Ohura :—

What is the cause of grass always sticking inside of a sheep's jaw? Is there any cure for it?

The Live-stock and Meat Division :—

We presume that you are referring to the accumulation of half-chewed grass lodging between the molar teeth and the cheeks. This is due to irregularities of the molar teeth, and generally occurs when young animals are changing them. Looked at externally, a casual observer would think the condition seen was due to some enlargement of the jaw or tumour. All you have to do is to insert your finger into the mouth and work the grass out.

SPECIMEN FOR IDENTIFICATION.

R. C. T., Tarata :—

Under separate cover I am sending a specimen of which I should like to know the nature. Opinion locally is divided, some people maintaining that it is a fungus, others that it is somewhat in the nature of a nest of some insect. The specimen was taken from a rata log which was being split. Only a very small part was visible from the outside.

The Biologist :—

The specimen sent is a portion of one of the dry-rot fungi, and is probably *Merulius lacrymans*. This fungus is not uncommon on dead logs and stumps. In Europe it is sometimes troublesome in sawn timber, but in New Zealand is rare outside the forest.

BLACKBERRY-MOTH.

A. S., Reefton :—

Under separate cover I am forwarding some specimens of caterpillars for your inspection. About the end of February numbers of white moths were to be found hovering over the blackberry-bushes at about dusk. Later on, noticing a bush with leaves shot holed as if attacked by some pest, an inspection disclosed numbers of caterpillars, similar to those sent, eating the leaves attacked, which then withered away. Over some twenty-five miles of country that has come under my observation I find this insect prevalent. Latterly I have come across blackberry-bushes which are dying off. I do not think this is to be accounted for by the season of the year, as where the autumn decay has set in the leaves simply turn yellow and fall off, whilst in the instances mentioned the leaves are full of perforations, curled up, and dry, but still remain on the stems, whilst the stems themselves are dead or dying and can be easily broken in two with the fingers, only the tops of the bushes remaining green. Considering how the blackberry has overrun the coast, any pest that would check them would certainly be welcome, provided at the same time orchards do not come in for attention as well. Hence I am sending these specimens for identification. Is this pest likely to prove yet another for the orchardist to contend against?

The Biologist :—

The specimens sent have been attacked by the blackberry-bud moth (*Carposina adreptella*). This moth is spreading considerably and doing some good work in checking the development of blackberry, but in most cases the growth of the weed seems too luxuriant for the moth to effect permanent injury. This moth is likely to attack raspberries and allied fruits.

BUDDING.

MISS F. M. BRIGHTWELL, Tarata, Taranaki :—

When you cut the bud off the tree there is a small piece of wood in the bark—have you to take that out, or leave it in ? What I mean is that there is a little bit up in the eye, and if it is taken out it leaves a cavity in the eye. My budding is never a success.

The Orchards, Gardens, and Apiaries Division :—

In the case of the budding of most classes of fruit-trees it is not necessary to remove all the wood from the bud it is intended to insert, provided that the bud has been cleanly cut with a sharp knife and only a small portion of wood taken with the bud. The secret of successful budding consists in carrying out the work at a time when the stock is in a suitable condition to receive the bud, and tying the bud in tightly so that no moisture may be able to penetrate between the bud and the stock.

SHELTER-BELT.

P. B., Aporo, Nelson :—

We wish to grow a shelter-belt to protect our orchard from winds off the sea. The orchard runs right up to the edge of bluffs about 80 ft. high, overlooking Tasman Bay, Nelson. What kind of trees are most suitable for the purpose, and how should they be planted ? Would *Pinus insignis* grow well in such a situation ?

The Orchards, Gardens, and Apiaries Division :—

For a shelter-belt on your land *Pinus muricata* is preferable to *Pinus insignis*. It is a splendid shelter-tree, and is dense-growing from the base upwards. It is slightly slower-growing than *Pinus insignis*.

TOMATO-CULTURE.

P. C. H. W., Papanui :—

In preparing ground for tomatoes would lime be best applied now or in the spring ?

The Orchards, Gardens, and Apiaries Division :—

On your land the lime should be applied in the early spring at the rate of about 10 cwt. per acre. Another dressing should be given after an interval of three or four months.

BEES.

"SUBSCRIBER," Canterbury :—

Bees have taken possession of a corner of the house. Would it be possible for me to hive them ? I should be glad to know the best way to do it.

The Orchards, Gardens, and Apiaries Division :—

Not knowing the exact circumstances and position of the bees, we cannot say if it would be possible to hive them. In a case of this kind it is nearly always necessary to remove some boards from the side of the house and adjacent to the bees. The combs containing the bees should then be cut away and removed to the hive placed on the roof of the house. Should this not be practicable, procure a bee-smoker, fill with dry sacking sprinkled with crude carbolic acid, and smoke the bees from their haunt. Sprinkle the place with carbolic and nail the boards on again, taking care to tightly close every aperture, and so excluding the bees from again gaining access.

LOGANBERRIES.

A. P. R. E., Papatoetoe :—

Do loganberries require pruning? If so, to what extent? Do they sucker?

The Orchards, Gardens, and Apiaries Division :—

In pruning loganberries the rods that have borne fruit should be cut out, so as to give all the space to the young rods, which will bear fruit next season. If neglected, loganberries will throw up suckers to a certain extent. Any suckers showing should be promptly broken off.

APPLE FOR IDENTIFICATION.

F. S. B. W., Sergeant's Hill :—

Could you let me know the name of the apple enclosed? It is a variety of no use for cooking, as I have boiled them for twenty minutes, and then they are only like a piece of chamois-leather. I may add that the tree is an enormous bearer, and no blight seems to affect it.

The Orchards, Gardens, and Apiaries Division :—

The name of the apple forwarded for identification is Golden Harvey, a very fair dessert apple and a heavy bearer, and almost blight-proof. Owing to its small size, this variety is not grown to any extent.

LAYING DOWN PERMANENT PASTURE.

"AMATEUR," Gordon, Te Aroha :—

I have a paddock of 38 acres that I intend to put down in permanent pasture. At the present time it is down in turnips, and I shall put stock on it next month, and they will come off early in August. Would it be advisable then to plough it up, &c., and sow in grass for the spring, or do you advise sowing, say, early in March? I would like to put down in spring, as the ground would be lying useless, and weeds would grow if I had to wait for March.

The Fields and Experimental Farms Division :—

Provided that the land is fairly well drained and that the weather-conditions are suitable for working the land so as to obtain a fine yet firm seed-bed (an important factor in laying down land to pasture), it would be advisable to sow in early spring. Should this not be possible, sow at a time when the soil is in good physical condition, there being sufficient moisture and warmth to germinate the seed and promote satisfactory growth. On lightish land a good time for seeding is after an early crop of turnips, when the land has been well manured and trampled by sheep.

HAZEL-NUT TREES, ETC.

"KOHITANE," Heatherlea, Levin :—

1. I have a hedge of hazel-nut trees which bear only a very few nuts every year. The trees look very healthy, but have been allowed to sucker. Would this be the cause of their not bearing?

2. What is the best time of the year for striking *Escallonia Macrantha* and ngaio slips, and what method?

The Orchards, Gardens, and Apiaries Division :—

1. The reason why the hazel-nut trees bear only a few nuts every year is probably on account of non-fertilization. In some parts of the Dominion the catkins which bear the pollen are produced too early in the season, so

that the pollen is lost before the buds that should produce the nuts are open. It is possible, however, to correct this defect by saving the pollen, keeping in a dry condition, and dusting over the trees when the buds that should produce the nuts are fully open.

2. Cut slips about 8 in. in length and plant in August in well prepared friable soil, leaving two or three buds above ground.

PINUS RADIATA.

MR. F. R. HIGGINS, Hurford Road, Omata :—

Will you tell me the way to grow *Pinus radiata* seed ? My wife and children collected about a pint of seed last year, and we set it in the garden, but not a single seed grew. They opened the cones by laying them on the stove. Would that hurt the seed ? Should the seed be soaked in hot water, and do they require any manure ?

The Orchards, Gardens, and Apiaries Division :—

The seed of the *Pinus radiata* is very easily grown. It can be raised in any good garden soil, either in a well-prepared bed or boxes. When preparing the soil it should be fairly dry. Give the surface a smooth and level condition ; the finishing-off is best done by sieving the soil. When the bed or box is finished sow the seeds fairly thick so that they lie about half an inch apart. Then cover the seed by sieving about half an inch of good soil over it. The surface may then be lightly pressed down with the back of the spade, not patted hard. After that has been done sprinkle lightly with water from a can that has a fine rose. Care is required in watering to avoid washing away the soil. Damp it at short intervals until the proper amount of moisture is obtained. Cover the bed with scrim stretched on a frame if the weather is dry and sunny, but if dull leave it off. The reason the seeds from the cones did not grow is they were killed with heat. Next time put the cones in a shallow box in a sunny place on a veranda. They do not require any soaking or manure.

STRAWBERRIES.

"INQUIRER," Onewhero :—

My strawberry-plants are turning black and the leaves are spotted. I enclose a few to show you the way they are going, and the plants are coming right up on to the surface of the ground. What ought I to do for them ? I spray every winter, but this blight gets them all the same.

The Orchards, Gardens, and Apiaries Division :—

The strawberry-leaves have been attacked by leaf-spot. The Bordeaux mixture—4-5-50 strength—is recommended as a preventive against attack by this disease. As to the plants coming right up to the surface of the soil, we should be inclined to say that they were not planted sufficiently deep.

Specimens of Fruit and Vegetables for Identification.—Many persons send in for identification specimens of fruit, &c., which are very far from typical of variety. It is therefore asked that any person sending in fruit for identification will forward at least three typical specimens, together, if possible, with samples of the twigs and foliage. These should be accompanied by a short description of the tree—that is, whether a spreading or upright grower, whether deemed liable to any disease, and approximately the age of the tree. These particulars would greatly facilitate the work of identification.—*T. W. Kirk.*